DOCUMENT RESUME

ED 135 385 IR 004 495

AUTHOR	Whaler, Bruce G.; Joyce, Charles C.
TITLE	Scientific and Technical Information: Options for National Action.
INSTITUTION	Mitre Corp., McLean, Va.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	Nov 76
CONTRACT	NSF-76-SP-1002
NOTE	73p.; Tables may be marginally legible due to small print of original
EDRS PRICE	MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS	Annotated Bibliographies; *Federal Legislation; Federal Programs; *Information Dissemination; National Programs; *Review (Reexamination); *Sciences; *Technology
IDENTIFIERS	Mitre Corporation; Office of Science and Technology Policy; Public Law 94 282; *Scientific and Technical Information

ABSTRACT

To provide interim guidance for the Office in matters of scientific and technical information (STI) prior to the report of the President's Committee on Science and Technology, MITRE conducted an analysis of Public Law 94-282 based upon common precepts of past reports and documents. The report recommends the creation of new organizational mechanisms to deal with Federal and national STI concerns, and further study to obtain concrete data and contemporary information on key STI issues. An annotated bibliography of the documents examined is included. (WBC)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED135385

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

SCIENTIFIC AND TECHNICAL INFORMATION: OPTIONS FOR NATIONAL ACTION

For:

NATIONAL SCIENCE FOUNDATION

Division of Science Information

Prepared by:

BRUCE G. WHALEN

Principal Investigator

CHARLES C. JOYCE, JR.

THE MITRE CORPORATION, METREK DIVISION, McLean, Virginia

NOVEMBER 1976

IR004495

EXECUTIVE SUMMARY

The recent establishment of the Office of Science and Technology Policy (OSTP) in the Executive Branch of the Federal Government reflects, in part, a growing concern that issues related to scientific and technical communication need attention at the highest levels of government. The enactment of Public Law 94-282, the National Science and Technology Policy, Organization and Priorities Act of 1976, establishes a broad Federal policy with respect to scientific and technical information (STI), namely "It is the responsibility of the Federal Government to promote prompt, effective, reliable, and systematic transfer of science and technology information by such appropriate methods as programs conducted by non-governmental organizations, including industrial groups and technical societies." The law also reflects the Federal Government's responsibility, "...not only to coordinate and unify its own science and technology information systems, but to facilitate the close coupling of institutional scientific research with commercial application of the useful findings of science." The law does not, however, establish mechanisms to deal with STI concerns. Instead, a President's Committee on Science and Technology will be established to conduct a comprehensive, two year survey of all aspects of Federal research and development, including STI.

In order to identify major STI issues and action alternatives for the OSTP, MITRE was requested to undertake an analysis of the STI aspects of P.L. 94-282. Past reviews and studies were used as the basis of the analysis. Major concerns reflected in these documents were determined and options for action were developed which are specific approaches that the OSTP could take to begin to address national STI concerns. This report is the result of the analysis effort.

For the past two decades STI issues have been the subject of a variety of reviews and studies conducted by a range of eminent organizations and individuals, beginning with the William O. Baker panel of the President's Science Advisory Committee in 1958. More recently, STI has also become a concern of the Congress of the United States, particularly the House Committee on Science and Technology. The reports and documents produced from these efforts reflect three common precepts:

1. *It is important.* STI is an integral part of research and development and the primary means by which research results are translated into useful applications for the well-being of the nation.

2. *STI is big business.* It encompasses both the governmental and private sectors of the economy and represents billions of dollars in annual expenditures. Every indication is that it is growing at a rapid rate commensurate with the growth of the "Information Industry" in general.

3. *There are problems.* The growth of STI and STI systems has not been guided by coordinated policies, resulting in inefficiencies, potential duplication and

waste, and causing both organizational and managerial problems. Also, the ability of STI systems to serve the needs of users has been questioned.

The underlying rationale for conducting these major STI studies and reviews is that little is being done by the Federal Government to deal with STI issues although the government, as the largest sponsor of research and development, should bear responsibility for assuring an effective national system for scientific and technical communication.

Given the broad policy mandates delineated in P.L. 94-282, and recognizing that the survey will not be completed for at least two years, the OSTP is then faced with the fundamental decision of whether to initiate action in the STI area now, or wait until the survey effort has been completed. What can the OSTP do to begin to address the complexity of issues surrounding STI? Based on MITRE's review of past efforts, two categories of action are suggested:

1. New organizational mechanisms to deal with Federal as well as national STI concerns could be established, including:

   - *A focal point* to assume responsibility for agency-wide direction and control of STI activities within each Federal agency engaged in research and development.

   - *A Federal Agency Coordinating Group*, composed of agency focal point representatives and other concerned Federal organizations, to serve as a focal point for coordination and management of Federal STI activities. The Coordinating Group would support the Federal Coordinating Council for Science, Engineering and Technology (also established under P.L. 94-282) in matters dealing with Federal STI concerns.

   - *An Information Policy Board*, composed of representatives from the major Federal agencies involved in government-wide policy research and policy development relating to STI (e.g., OSTP, the Office of Telecommunications Policy, and the National Science Foundation's Division of Science Information), to develop and recommend STI policies for approval by the President and subsequent adoption by all concerned Federal agencies. The Board would be supported by one or more advisory committees representing the major "stakeholders" in the nation's STI enterprise, i.e., the private sector, state/local governments, professional groups and the like. The advisory committees would support the Board in its policy formulation role and serve as a bridge between the government and the private sector.

2. The need for further study of the STI area has been repeatedly expressed. Past major studies tend to express needs for action based on informed opinion and do not, on the whole, offer statistical or anecdotal evidence to substantiate the recommendations offered. Therefore, the OSTP could initiate a series of activities designed to obtain more concrete data on the nation's STI enterprise and more contemporary information on key STI issues. Areas for consideration include: (1) Compiling a body of data on the structure and economic parts of the nation's STI enterprise for use by the OSTP and other concerned organizations; (2) Reviewing current Federal STI policies and developing recommendations for formulation of improved policies; (3) Investigating the desirability of further centralization of Federal STI activities; (4) Assessing the issues related to standards and/or compatibility of Federal STI systems; and (5) Evaluating the current effectiveness of the major Federal STI systems.

Implementation of the new organizational mechanisms would assist the OSTP in dealing with national and Federal STI issues by providing a framework through which improved STI policies could be developed and improved coordination and cooperation of STI activities could be achieved. The results of the special study activities would provide a more rational basis on which to make decisions regarding the resolution of STI issues as well as assist the President's Committee in conducting the STI aspects of its survey. These proposed action options are by no means all-inclusive; however, they do reflect the consensus of opinion of a number of eminent STI study reports and provide a basis for addressing problems associated with scientific and technical communication.

TABLE OF CONTENTS

	Page
LIST OF ILLUSTRATIONS	vii
INTRODUCTION	1
Legislative Mandates	1
Approach Used and Report Organization	1
THE NEED FOR ACTION	2
STI Concerns	2
Major Studies	4
Special Studies	4
Congressional Documents	6
The Legislative Process	7
Concluding Observations	7
PREVIOUS RECOMMENDATIONS	8
Major Studies	8
Congressional Testimony	8
Concluding Observations	11
OPTIONS FOR ACTION	11
Key Issues	11
Major Considerations	13
New Organizational Mechanisms	14
Special Studies	18
Relation to the President's Committee	19
APPENDICES	
A—STI REFERENCES IN THE LAW	21
B—OTHER ISSUES RAISED	21
BIBLIOGRAPHY	27
GLOSSARY	67

LIST OF ILLUSTRATIONS

Figure		Page
1	Organizational Action Options—An Overview	16
2	A Summary of the STINFO-Related References in the National Science and Technology Policy, Organization and Priorities Act of 1976	22

LIST OF TABLES

Table		Page
I	Major Documents Analyzed	3
II	Common STI Recommendations Expressed By Major Studies	9
III	Key Actions Proposed By Major Studies	10
IV	Common STI Views Expressed During Congressional Hearings	12

INTRODUCTION

Legislative Mandates

The passage of the National Science and Technology Policy, Organization and Priorities Act of 1976 (Public Law 94-282) reflects a growing concern of the Congress, and others, about the nation's scientific and technical information (STI) enterprise. The new law addresses STI directly or has language related to the dissemination or transfer of research results in 11 of its 45 major sections.* In particular, the Findings and Policy section (Title I) expresses principles for STI that the Office of Science and Technology Policy (OSTP) is expected to address, for example:

1. One of the principles of the new law is that effective management and dissemination of STI is necessary to the development and maintenance of a solid base for science and technology.

2. In the policy implementation section of Title I the law states: "It is the responsibility of the Federal Government to promote prompt, effective, reliable and systematic transfer of science and technology information by such appropriate methods as programs conducted by nongovernmental organizations, including industrial groups and technical societies."

3. The law further recognizes the Federal Government's responsibility "... not only to coordinate and unify its own science and technology information systems, but to facilitate the close coupling of institutional scientific research with commercial application of the useful findings of science."

The new law, while expressing broad STI policy requirements as one of the rationales for establishment of the OSTP, does not establish specific mechanisms for dealing directly with national STI concerns. Instead, a President's Committee on Science and Technology* is being established to conduct a comprehensive survey of all aspects of Federal research and development activity, including STI. The survey was one of the fundamental purposes of the law and is expected to take two years to complete. Given this situation, the OSTP is currently in the position of either initiating action in the STI area to assist the survey effort, or deferring action until the Committee completes its work. A fundamental question, therefore, is what are the major STI issues facing the OSTP and what types of action could be taken to deal with them?

Approach Used and Report Organization

This question has been the subject of a variety of past reviews and studies conducted by a range of eminent organizations and individuals over the past two decades. It has also been a concern of the Congress of the United States, particularly the House Committee on Science and Technology. Accordingly, MITRE was requested by the National Science Foundation, Division of Science Information, to review these past efforts, determine the major concerns reflected in them, and identify those recommended courses of action which the OSTP could take to deal with such concerns.

The results presented in this report were derived from (1) a review of 13 key reviews and studies, (2) a review of the legislative

*Appendix A provides a discussion of the STI references included in P.L. 94-282 as well as an outline of the organizational structure established by the law.

history of P.L. 94-282, and (3) a review of the language of the law itself. Using these sources, the major points made were identified and paraphrased into a common set of needs and recommendations for OSTP consideration. Needs for action are prescribed first followed by a summary of the common recommendations of past reviews and studies. Based on these recommendations, options for action have been developed which are specific approaches that the OSTP could take to deal with STI concerns. Two appendices are also included which provide supporting information derived from the analysis.

THE NEED FOR ACTION

STI Concerns

The major STI reports produced by the various study groups and the Congress over the past two decades fall into three broad categories: (1) major studies, (2) special studies focused on a specific aspect of STI, and (3) Congressional documents. Table I lists the major documents on which this report is based. All of these documents reflect three common precepts:

1. *STI is very important.* It is an integral part of research and development and the primary means by which the findings of research are translated into useful applications for the well-being of the nation. As the Baker panel report indicated in 1958: "Progress in science and technology is dependent upon the free flow of scientific information," and that "publication of information is absolutely essential."

2. *STI is big business and the stakes are high.* It encompasses the governmental and the private sectors of the economy and represents billions of dollars in annual expenditures. A recent study sponsored by the NSF/DSI* determined "... the total resources expended in scientific and technical communication in the U.S. are estimated at $9.4 billion in 1975. This figure includes the costs incurred by authors, publishers, libraries and secondary sources, and users in the production and use of S&T [scientific and technical] books, journals, reports and other publications."

3. *Severe STI handling problems exist.* The growth of STI and STI systems has not been guided by coordinated policies, resulting in inefficiencies, potential duplication and waste, and causing both organizational and managerial problems. Further, the ability of the STI systems to serve the needs of users has been questioned. The SATCOM report indicated "... the proliferation of useful research together with the burgeoning increase in the numbers of trained people involved in science and technology has overcome the capacity of the classical information services to respond effectively. To avert a crisis of major proportions, the only present alternative is a strong effort to accelerate the utilization of modern computer-aided techniques for handling information."

Further, the underlying rationale for conducting these studies, as well as the basis for Congressional concern, is:

1. Little is being done (or has been

*King Research, Inc., *Statistical Indicators of Scientific and Technical Communication (1960-1980), Volume I: A Summary Report*, October, 1976, page 13.

TABLE I
MAJOR DOCUMENTS ANALYZED

MAJOR STUDIES

YEAR	AUTHOR	TITLE	SPONSOR
1958	Baker	Improving the Availability of Scientific and Technical Information in the United States	President's Science Advisory Committee
1962	Crawford	Scientific and Technical Communication in the Government	President's Science Advisor
1963	Weinberg	Science, Government and Information--The Responsibilities of the Technical Community and the Government in the Transfer of Information	President's Science Advisory Committee
1965	Knox	Recommendations for National Document Handling Systems in Science and Technology	Federal Council for Science and Technology
1969	Cairns (SATCOM)	Scientific and Technical Communication: A Pressing National Problem and Recommendations for its Solution	National Academy of Sciences-Engineering
1972	Greenberger	Making Technical Information More Useful--The Management of a Vital National Resource	National Science Foundation
1975	Chartrand	Federal Management of Scientific and Technical Information (STINFO): The Role of the National Science Foundation	Library of Congress (For U.S. Senate)
1975	Burkhardt	Toward A National Program for Library and Information Services: Goals for Action	Nat'l Commission on Lib. & Info. Science
1976	Auerbach Associates	DDC 10 Year Requirements and Planning Study, Volume I: Executive Summary	Defense Documentation Center
1976	Becker	A National Approach to Scientific and Technical Information in the United States	National Science Foundation

SPECIAL STUDIES

1972	Staats	Effectiveness of Smithsonian Science Information Exchange Hampered by Lack of Complete, Current Research Information	General Accounting Office
1975	Burchinal	A Review of Federal Agency Responses to Selected Recommendations Made in Three Major Scientific and Technical Information Reports	National Science Foundation
1976	Staats	Observations on Collection and Dissemination of Scientific, Technical, and Engineering Information: National Technical Information Service	General Accounting Office

CONGRESSIONAL DOCUMENTS

1970	House	Toward A Science Policy for the United States (Committee Print)	Committee on Science and Astronautics
1975	House	National Science and Technology Policy and Organization Act of 1975, Report No. 94-595	Committee on Science and Technology
1975	House	The National Science Policy and Organization Act of 1975, Hearings on H.R. 4461 and H.R. 7830, Report No. 15	Committee on Science and Technology
1975	House	A Proposed National Science Policy and Organization Act of 1975 (Committee Print)	Committee on Science and Technology
1976	House	National Science and Technology Policy, Organization and Priorities Act of 1976, Public Law 94-282	Committee on Science and Technology

done) by the Federal Government to address STI problems and concerns.

2. The Federal Government, as the largest sponsor of research and development, should bear the major responsibility for assuring an effective national system for scientific and technical communication.

This rationale is also reflected in the documents forming the legislative history of P.L. 94-282 and in the language of the law itself, as suggested in Appendix A.

Given these primary concerns and rationale, what then are the real problems in the STI area that the OSTP should address and what are the best methods for dealing with them? An examination of this question, based upon what other knowledgeable individuals and groups have said, follows.

Major Studies

Beginning in 1958 with the Baker panel report, the 10 major studies concur that STI is a very important part of research and development which needs special attention at the highest levels of government. The weight of opinion reflected in these documents is that there are major problems in the handling of STI and improved coordination/management of STI policy and programs is needed. The Baker, Crawford, Weinberg, Knox, SATCOM, Greenberger, Chartrand and NCLIS reports (which cover a 17 year time span from 1958-1975), on balance, stress the need for more effective communication of STI. The Auerbach study, while directed specifically at the needs of the Defense Documentation Center, includes a survey of other Federal STI systems outside of the Department of Defense and concludes that improvements in interagency coordination and cooperation are needed and that there is a lack of a uniform structure in STI within the Federal Government. Similarly, the Becker study includes a review of many of the same major studies used to prepare this report and also concludes that improvements in STI policy formulation are needed as well as in coordination/management of STI programs.

The consensus of these studies, in terms of the need for action, can be summarized as follows:

1. STI is important, an integral part of research and development, and the primary means by which research results are translated into useful applications for the well-being of the nation.

2. There are information handling problems in the STI area which need to be addressed.

3. STI policies are lacking and are sorely needed.

4. Management of STI activities is fragmented and needs improvement.

The tendency of these studies is to express needs for action based on informed opinion rather than on the delineation of specific problem areas supported by hard evidence. They do not, on the whole, offer statistical or extensive anecdotal evidence to substantiate the recommendations offered.

Special Studies

In addition to the major studies, three special studies were reviewed: (1) A special survey conducted by the Science Advisor's Ad Hoc Task Group on Federal Agency STI Review in 1975, (2) A 1972 General Accounting Office (GAO) report dealing with the

Smithsonian Science Information Exchange (SSIE), and (3) A 1976 GAO report dealing with the National Technical Information Service (NTIS).

The survey report documents responses from 15 Federal agencies having significant STI systems on recommendations made in three major studies (Weinberg, SATCOM, Greenberger). The intent of the survey was to determine the extent to which the recommendations made by the studies were implemented. The results of the survey were:

1. Most of the Federal agency representatives were aware of the reports (10 out of 15), but only 5 were actually very familiar with them.
2. Most of the agencies (60%) did not report having developed effective agency-wide STI focal points (however, within this 60% there were reported examples of agency-wide coordination efforts in specific areas).
3. The survey found that the agency representatives were supportive of the recommendations made by the three studies.
4. The report concludes that agency-wide management of STI activities lags behind management of specific STI programs within agencies. A further discontinuity occurs between the agency and government-wide levels, and a still broader void exists at the national level. The agencies concurred, however, with the desirability of and need for such coordination.

Thus this survey determined that the management and coordination problems expressed by the past national studies still persists today (1975).

The GAO report dealing with the SSIE (1972) concluded:

1. Most government agencies are not using the SSIE to its fullest extent because of claims that its data base is not current or complete. At the same time the SSIE's ability to provide current information is being hampered because Federal agencies are not providing it with necessary information (agencies are not required to submit complete information to the SSIE).

The GAO report dealing with the NTIS (1976) concluded:

1. Some Federal agencies are not providing STI documents to NTIS and only a small amount of information is obtained from sources other than Federal agencies.
2. Federal agencies are not required to submit information to NTIS and NTIS legislation does not specifically designate NTIS as the sole clearinghouse for STI in the Federal Government. Moreover, the legislation of other Federal agencies authorizes them to collect and disseminate their own STI.
3. A key barrier to cooperation with the NTIS is the legislative mandates of other Federal agencies to collect and disseminate their own STI. Also, the need to pay a fee for inputting of documents to NTIS acts as a deterrent. Further, NTIS is not actively trying to obtain data from non-Federal sources because of a problem

with fees and a desire of the sources to keep reports from being made public.

These three studies tend to reinforce some of the issues and problems expressed by the major studies, especially the need for improved coordination of Federal STI systems. The findings of the SSIE and NTIS reviews are particularly important inasmuch as these organizations represent the only Federal mechanisms whose mandates cut across all missions and disciplines; they are the only centralized sources of STI which deal with dissemination of all Federally sponsored research and development results.

Congressional Documents

MITRE's review also included documents related to the legislative history of P.L. 94-282. Among the myriad of issues, problems and concerns expressed in these documents are the following:

1. The Committee on Science and Technology indicated:
   - Abundant evidence exists that management of STI today is resulting in wasteful neglect of available knowledge and the funding of needless research to report findings already in the literature.
   - There are problems with the current mechanisms for disseminating STI which adversely affect the nation's R&D efforts. The flow of information from mission-oriented agencies is working well, but the flow to potential users in other Federal agencies is not.
   - STI issues are as much policy ones as organizational ones and that STI issues are very important and need further study.
   - Committee staff inquiries into the major problems with the SSIE which were documented in the 1972 GAO report found that these problems continued to exist in 1975.
2. The hearings held on H.R. 4461 (the forerunner of H.R. 10230 which became P.L. 94-282) identified several other STI problem areas:
   - There is a need for improved national policies in the STI area.
   - The Information Industry Association maintains that current Federal STI services procurement policies discriminate against the private sector as these policies demonstrate an unfair preference for nonprofit sources.
   - The National Federation of Indexing and Abstracting Services maintains that information collected by Federal agencies often overlaps that collected by the discipline services and that this situation creates serious imbalances in the nation's overall information distribution system.
   - The American Association of Law Libraries maintains that the current document depository system by which government, academic and public libraries receive Federal publications free of charge is deficient and inadequate, especially in the area of science and technology.

These problem areas, like the majority of the major studies analyzed, reflect opinions expressed by persons and organizations who were active in the legislative process of P.L. 94-282. They are not supported by any hard evidence presented in the documents reviewed.

The Legislative Process

In addition to MITRE's document review, a brief review of recent laws passed by Congress was undertaken to obtain examples of those containing STI components. In 1974 alone at least 15 laws were passed which specifically called for the establishment of new STI systems. (A list of these laws, with an abstract describing their STI components, is provided in the attached Bibliography.) In all likelihood, an extensive review of all recently passed legislation would reveal authorizations for additional STI systems.

The conclusions reached from this review further support the underlying rationales expressed by some of the documents analyzed, namely:

1. The Congress is very concerned with the need for information and recognizes its importance to the effective conduct of programs sponsored by the Federal Government.

2. The establishment of new STI systems as a result of legislative authority offers potential for increased duplication as well as an increase in the type and scope of organizational/coordination problems. If such potential is realized, it further points to the need for Federal action in the STI area.

Concluding Observations

The preceding discussion focused on the major STI concerns expressed by a wide variety of documents prepared over a broad time span and for a variety of purposes. Most of the major STI concerns expressed by these documents are based on informed opinion rather than an analytical assessment of evidence. This does not mean that these problems are not valid, only that there is little hard evidence available for articulating strategy, analyzing problems, or determining priorities for dealing with national STI concerns. MITRE's concluding observations, based on an in-depth review of these materials, are as follows:

1. There is overwhelming testimony that STI concerns are very important and need to be addressed at the highest levels of government.

2. Many STI-related problems and issues have been expressed, but there is little supporting evidence to substantiate the scope, magnitude, priorities, and direction of change of these problems.

3. Recommendations regarding Federal action on STI issues have been made repeatedly over many years but little action has been taken.

4. The Congress, with the passage of P.L. 94-282, has placed responsibility for Federal action in the STI area in the new Office of Science and Technology Policy.

Appendix B provides a list of other problems, issues or concerns expressed in the documents analyzed for this study.

PREVIOUS RECOMMENDATIONS

Major Studies

The major studies generally reflect six common views regarding recommendations for Federal action to deal with STI concerns:

1. A focal point for direction and review of national STI activities should be established in the Executive Branch of the Federal Government.
2. STI purposes, objectives and governing principles should be made part of Federal policy.
3. Each Federal agency engaged in research and development should establish an internal focus of responsibility and authority for agency-wide direction and control of its STI activities.
4. The Federal Government should develop additional, or strengthen existing, clearinghouses, specialized information centers or national networks for handling of STI.
5. Additional studies and evaluation efforts of STI should be undertaken.
6. The National Science Foundation's Division of Science Information should have an expanded role in national STI activities.

Table II summarizes the general recommendations made by the major studies. The Baker, Crawford, Greenberger and Becker reports stress organizational solutions for resolution of STI problems. The Weinberg, SATCOM and NCLIS reports stress organizational solutions as well as specific approaches for developing improved information handling methods. The Knox report addresses an improved method for handling STI. The Chartrand report does not offer its own recommendations per se,* but does support the need for organizational entities to deal with STI concerns. The Auerbach report supports the need for a focal point of responsibility for STI within each Federal agency engaged in research and development.

The key actions proposed by these studies are summarized in Table III. As indicated in Table III, the majority of these studies proposed organizational solutions to deal with STI concerns. In particular, the Becker, NCLIS, Greenberger, SATCOM, Knox, Weinberg and Crawford reports propose or suggest the establishment of an organization in the Executive Branch to deal with STI policy questions. The Auerbach, NCLIS, Greenberger, Knox, Weinberg, Crawford and Baker reports suggest actions related to the establishment of organizational mechanisms for improving the coordination of Federal STI activities. The Becker, Chartrand, Greenberger and Baker reports suggest the need for improved information science research and development, to be conducted by the NSF's Division of Science Information.

Congressional Testimony

The House Committee on Science and Technology, in 1975 under H.R. 4461 (the forerunner of H.R. 10230 which subsequently became P.L. 94-282), offered legislation to create a new Science and Technology Information and Utilization Corporation. The proposed corporation called for the merging of the NTIS, SSIE and NSF/DSI into a single entity. The rationale for the corporation concept was that (1) STI is conceded to

*The Chartrand report summarizes recommendations made by past studies.

TABLE II
COMMON STI RECOMMENDATIONS EXPRESSED BY MAJOR STUDIES

STUDY/REPORT (YEAR, AUTHOR, SPONSOR) / KEY STI RECOMMENDATION	PSAC	PSA	PSAC	FCST	NAS-NAE	NSF	LC	NCLIS	DDC	NSF/DSI
	Baker	Crawford	Weinberg	Knox	Cairns (SATCOM)	Greenberger	Chartrand	Burkhardt	Auerbach Assoc.	Becker
	1958	1962	1963	1965	1969	1972	1975	1975	1976	1976
1. A focal point for direction and review of STI activities should be established in the Executive Branch		YES	YES	YES	YES	YES	YES	YES		YES
2. STI purposes, objectives and governing principles should be made part of Federal policy		YES	YES (I)	YES (I)	YES (I)	YES	YES	YES		YES
3. Each Federal R&D agency should establish an internal focus of responsibility for agency-wide direction and control of STI		YES	YES	YES (I)		YES			YES (I)	YES (I)
4. The Federal Government should develop new, or strengthen existing, clearinghouses, specialized information centers, or national STI networks		YES	YES	YES				YES	YES (I)	
5. Additional studies and evaluation efforts of STI issues, problems, and concerns should be undertaken					YES		YES (I)	YES (I)		YES (I)
6. NSF/DSI should have an expanded role in future, national STI activities	YES					YES	YES (I)			YES

1. Bibliographic information for each major study is provided in Table I.

2. Sponsor codes used are:

PSA	= President's Science Advisor	LC	= Library of Congress
PSAC	= President's Science Advisory Committee	NCLIS	= National Commission on Library and Information Science
FCST	= Federal Council for Science & Technology	NSF/DSI	= National Science Foundation, Division of Science Information
NAS-NAE	= National Academy of Sciences-National Academy of Engineering	DDC	= Defense Documentation Center
NSF	= National Science Foundation		

3. Response codes used are:

BLANK	= STI recommendation not expressed by study
YES	= Study concurred with recommendation
(I)	= Recommendation implied from study

TABLE III
KEY ACTIONS PROPOSED BY MAJOR STUDIES

REPORT*	PROPOSED ACTIONS			
	STI POLICY FORMULATION	FEDERAL AGENCY COORDINATION	INFORMATION SCIENCE R&D	OTHER
Becker 1976 NSF/DSI	Establish a national science information policy body in the Executive Branch of the Federal Government.		Strengthen the NSF/DSI by charging it with explicit national research and coordination responsibilities for STI.	Create an Institute, under OSTP auspices, with which STI elements in the public and private sectors can voluntarily affiliate.
Auerbach 1976 DDC		DDC should act as a focal point for coordinating DOD STI activities; improved coordination of other non-DOD STI agencies is recommended, but no specific approaches suggested.		
Burkhardt 1975 NCLIS	Establish a focal point in the Executive Branch to which private organizations and government agencies can turn for STI policy clarification (implied).	Establish a locus of Federal responsibility charged with implementing a national network of library and information services, coordinating the program under the guidance of NCLIS.		Proposed program consists of 9 basic objectives (goals) rather than a specific plan for developing a national network; coordination of Federal information programs is one of the goals.
Chartrand 1975 LC (Senate)	Establish an advisory group to address national STI concerns reporting directly to the President's Science Adviser (summary or recommendations made by others).		Reexamine the mission and program objectives of NSF/DSI (implies that DSI should be strengthened and play a larger role in national STI activities; this action based on recommendations made by others).	
Greenberger 1972 NSF	Establish an Information Policy Board, with both government and private sector representatives, in the Executive Branch of the Federal Government.	Create a Federal Technical Information Committee made up of agency representatives to coordinate Federal STI activities at the operational level and work on standards/compatibility issues.	See "Other."	Create a Technical Resource (NSF/DSI and NBS) to conduct and fund research and analytical studies, provide central consulting services to government agencies, and be a repository of STI expertise.
SATCOM 1969 NAS-NAE	Establish a Joint Commission on Scientific and Technical Communications, responsible to the Councils of the NAS-NAE, to develop more effective STI communication and policies.	See "Other."		Offers 55 recommendations for the improvement of cooperation between the public and private sectors, and greater standardization of STI systems and expanded international collaboration.
Knox 1965 FCST	Establish a central Federal mechanism to develop policies, guidelines, coverage, legislation, etc. leading to the creation of a national information and document handling network.	OST should clarify areas of responsibility among Federal agencies related to the planning and policy formulation for an integrated national network.		Several other suggestions are made relating to OST and COSATI's role in the area of coordination, planning and policy development of the national network.
Weinberg 1963 PSAC	The entire network of Federal STI systems should be kept under surveillance by the FCST and problems be given continued attention by the PSAC.	Each Federal agency should establish a highly placed focal point of responsibility for STI activities that is part of the R&D arm of the agency, not the administrative arm.		A total of 200 recommendations given reflecting a set of principles upon which action might be based rather than a plan for addressing STI concerns.
Crawford 1962 PSA	Establish within the Executive Branch an organizational focal point for Government-wide direction and review of Federal programs and activities related to STI.	Each R&D agency of the Federal Government should be directed to establish internally an appropriate organizational focus of responsibility for agency-wide direction and control of STI.		
Baker 1958 PSAC		Establish a Federal Science Information Service (NSF/DSI should assume this role) to aid and coordinate government and private efforts in STI.	The Federal Science Information Service would also encourage and support a long-term STI research and development program.	

*See Table II for a definition of abbreviations used and Table I for bibliographic information for each report.

be one of the nation's leading commodities and could therefore be handled by a corporate structure and (2) it may be desirable to make Federal STI dissemination efforts completely or partially self-sustaining.

Although this bill never became law and the corporation concept was not included in H.R. 10230, the testimony given about its pros and cons was reviewed as summarized in Table IV. A total of 16 witnesses appeared before the Committee and an additional 29 written statements were submitted. Of these 45 sources of information 20 specifically addressed the STI area, as indicated in Table IV.

The consensus of opinion of those testifying on STI during the hearings was that the corporation concept was not the appropriate approach to take at that point in time. In terms of recommendations offered during the hearings, the points made about the need for a Federal STI policy body, further study of STI activities, and an expanded role for NSF/DSI, parallel the recommendations made by the major studies.

A major limiting factor in the hearings, however, is the lack of testimony directed at specific STI issues or problems backed up with supporting evidence. The hearings generally reflect views based on informed opinion and present little evidence to support or refute specific needs for action.

Concluding Observations

For the most part, the analysis shows that the major recommendations made by prior studies tend to focus on the establishment of organizational mechanisms to deal with STI concerns. Three levels of organization have been implied:

- Individual Federal agency focus responsible for coordination of STI activities within each Federal agency engaged in research and development.
- Federal agency consortium to deal with interagency coordination and management concerns and to act as a forum for Federal STI policy formulation and direction
- Policy organization in the Executive to deal with national STI concerns and to act as a forum for all sectors of the economy which have an interest or stake in STI policy formulation.

To a lesser degree, these studies also expressed a need to learn more about the nature and extent of STI problems and issues and recommended that the STI area be further studied and evaluated. Recommendations to improve national STI networks were also provided as were suggestions that the NSF's Division of Science Information be strengthened and play an expanded role in national STI activities.

OPTIONS FOR ACTION

Key Issues

Given the needs and recommendations expressed by past studies of STI, and the mandates for STI which are reflected in P.L. 94-282, the OSTP is faced with two major STI issues:

1. *Policy formulation.* How can the Federal Government best stimulate the development of national policies for ensuring the most efficient and effective use of the nation's STI resources?
2. *Operations.* How can improved coordination and management of the

TABLE IV
COMMON STI VIEWS EXPRESSED DURING CONGRESSIONAL HEARINGS

*(Derived from an analysis of hearings held by the Committee on Science and Technology, U.S. House of Representatives on H.R. 4481, The National Science Policy and Organization Act of 1975, June 10, 11, 17, 19, and 23, 1975, Report Number 15)

COMMON STI VIEW* / PERSON/ORGANIZATION	Dr. H. Guyford Stever, Science Advisor to the President	Dr. Philip Handler, President, National Academy of Sciences	Hon. Elmer B. Staats, Comptroller General of the United States	Dr. Roger Revelle, Chairman of the Board, AAAS	Dr. Edward E. David, Vice President for R&D, Gould, Inc.	Dr. John C. Calhoun, National Association of State Universities	Dr. Arthur M. Bueche, Vice President for R&D, General Electric Co.	Dr. Conyers Herring, Former Chairman Advisory Science Info. Council, NSF	Dr. Lewis M. Branscomb, V.P. and Chief Scientist, IBM Corporation	Dr. Bowen C. Dees, President, The Franklin Institute	Dr. Ernest R. Gilmont, Chairman, Committee of Scientific Soc. Pres.	Dr. Eugene B. Skolnikoff, Director, Center for International Studies, MIT	A. Michael Noll, Past Assistant to the Director, Office of Sci. & Tech.	Drs. Trumbull and Kraus, for the American Institute of Biolog. Sci.	Paul G. Zurkowski, President, The Information Industry Association	Ben H. Weil for the National Federation of Abstracting & Index. Servcs.	Paul Theyer, Chairman of the Board, The UTV Corporation	Robert C. Stephenson, Special Progm Administrator, Texas A&M University	Marian Boner, President, American Association of Law Libraries	Alan C. Nixon, Past President, The American Chemical Society
1. In favor of the establishment of the Scientific & Technical Information & Utilization Corporation (Title IV)	NO	NO	NO	NO	YES		NO	NO	YES	NO	YES	NOT CLEAR		NO	NO	NO	YES	YES	NO	NOT CLEAR
2. Further study of ways to improve and strengthen Federal STI activities is needed	YES	YES	YES	YES				YES		YES	YES			YES	NO					YES
3. STI issues are very important and need to be addressed	YES	YES						YES	YES	YES	YES				YES	YES				YES
4. Federal STI activities need to be strengthened and/or improved	YES					YES		YES	YES	YES	YES				NO				YES	
5. Federal STI activities should remain decentralized	YES						YES	YES		YES					YES	YES	NO			
6. A Federal STI policy body or coordinating agency is needed	YES		MAY-BE					YES	YES	YES					YES					
7. SSIE and NTIS could be combined into a single organization	MAY-BE			NO					NO	YES			YES		NO					
8. NSF/OSI should be strengthened and remain independent of SSIE, NTIS, or a new corporation								YES		YES			YES			YES				

Response codes used are:

BLANK = No comment on STI view
YES = Concurred with STI view
NO = Did not concur with STI view
MAYBE = STI view was addressed, without agreement or disagreement
NOT CLEAR = STI view was addressed, but assessment of agreement or disagreement could not be made

nation's STI activities be achieved and, in particular, how can the Federal Government best coordinate its own STI activities to provide the most effective and efficient services?

Both of these major issues encompass a myriad of sub-issues or key questions to be addressed, many of which have been expressed by the documents analyzed in this study. In addition, a major consideration which cannot be overlooked is the relation of STI policy to information policy in general. Given that STI represents a subset of all information activities, can STI policies be formulated without taking into consideration broader information policies?

The documents reviewed by MITRE do not specifically address this concern as their attention is predicated on the importance of scientific and technical communication for the efficient conduct of research and development and for the fullest utilization of research results. However, based on MITRE's own experience, it seems certain that the field of STI will also be affected in the future by a growing awareness of the economic and social significance of a broad spectrum of information activities. Economists have estimated that employment in agricultural and manufacturing occupations has recently been surpassed in this country by employment in occupations based entirely on the production, utilization, or transfer of knowledge and information. This "Information Industry" is reputed to be one of the largest, if not the largest, industries in the United States.

The social significance of information is attested to by the fact that so many new Federal Government programs include a mandate from Congress for the dissemination of information of one kind or another to the public at large. Congressional concern with the misuse of information is reflected in recent legislation concerning privacy (P.L. 93-579, the Privacy Act of 1974) and the operation of Federal record keeping systems (P.L. 93-502, the Freedom of Information Act).

Accordingly, it appears certain that issues relating to STI policy will become more intertwined with general information policy concerns. It will be increasingly difficult to draw a line of distinction between STI and allied areas such as health, medical or consumer information. Greater attention to the respective roles of the Federal Government and the private sector in service activities, including information processing, is also being given by the Office of Management and Budget.

These considerations suggest that arrangements for addressing Federal and national STI issues should be effectively linked with those Federal offices and agencies which have significant policy and coordination responsibilities in the general area of information.

The key question for the OSTP at this point in time is what could be done to begin to address these major concerns?

Major Considerations

Recommendations for action by the OSTP must take into consideration the context in which previous suggestions for action were made. Most of the publications and documents reviewed were prepared prior to the passage of P.L. 94-282 and, as such, do not specifically address the OSTP. Also, many of the past studies offer suggestions related to the Federal apparatus that existed at the time of the study which is no longer in existence (e.g., the Committee on Scientific and Technical Information of the Federal Council for Science and Technology).

Therefore, the overriding factors in identifying options for action by the OSTP at this point in time include:

1. The OSTP is a new office with limited resources and there has been no similar apparatus in the Federal Government for the past three years.
2. One of the mandates of the new law is to conduct a survey to consider needs for improvements in STI; this survey will not be completed for at least two years.
3. The OSTP cannot be expected to deal initially with improvements in national STI networks, or similar operational concerns, until more is known about the STI area and mechanisms are designed for formulating policy and implementing policy decisions.

Accordingly, the options for action presented below reflect the most pressing need for the OSTP, that of establishing mechanisms to achieve an effective national STI policy and to begin to address the range of issues concerned with the operation of the nation's STI enterprise.

New Organizational Mechanisms

The broad STI policy mandates specified in P.L. 94-282 include both a Federal Government focus as well as a national focus of concern for the interests and role of the private sector, state and local governments, professional groups and the like. Organizational mechanisms to deal with STI issues must then be structured to deal with both Federal and national concerns. Past studies have suggested a three level approach:

1. Establishment of a focus of responsibility and authority for agency-wide direction and control of STI within each Federal agency engaged in research and development.
2. Establishment of a Federal Agency Coordinating Group, drawn from the individual agency focal points, to review Federal STI policy and help strengthen and improve the Federal Government's STI activities.
3. Establishment of an Information Policy Board to develop national STI policies and to serve as a forum for both Federal and non-Federal organizations engaged in the nation's STI enterprise. The Board would be supported by a series of advisory committees representing the major "stakeholders" in the nation's STI enterprise, i.e., the private sector, state/local governments, professional groups, international representatives, and the Federal Government (via the Federal Agency Coordinating Group).

The Becker, NCLIS, Greenberger, Weinberg and Crawford studies suggested the establishment of an Information Policy Board. The concept of a Federal Agency Coordinating Group was suggested specifically by the Greenberger study and implied by the Knox, Baker, NCLIS and Weinberg studies. The individual agency focal point concept was supported by the Auerbach, Weinberg and Crawford reports. In addition, the Becker report suggested the concept of an Institute with which STI elements in the public and private sectors could voluntarily affiliate. The purpose of the Institute would be to (1) give members of the STI community and the professional societies a continuing voice in shaping an improved program of informa-

tion science research and development, and (2) to provide them with a forum for planning and discussing STI programs from a national perspective. Although the Institute concept per se has not been suggested by previous reports, the concept of an Information Policy Board with members representing both Federal and non-Federal concerns has, particularly by the Greenberger report. Thus the inclusion of advisory committees as part of the proposed Information Policy Board is a result of the suggestions made by the Becker and Greenberger studies.

Figure 1 provides an overview of the relationships between the OSTP and the proposed new organizational mechanisms. A brief description of the functions which would be performed by each of these organizational entities, should they be established, is provided below.

Agency Focal Point

The primary function of the Federal agency focal point would be to assume responsibility for direction and control of STI activities in each agency funding research and development, particularly those having significant STI systems. The Weinberg report stressed that the STI activities of each agency, including the focal point, be part of the research and development arm of the agency, not part of the administrative arm. The basis for this concern is that managers of Federal research and development programs must recognize that the control and dissemination of STI is a vital part of the total research and development process.

The functions which would be performed by each agency's focal point include:

1. Determining what kind and how much information processing should be done and ensuring the proper handling and processing of the STI for which the agency is responsible.
2. Providing inputs to the Federal Agency Coordinating Group regarding problems, recommended solutions, and issues to be addressed from each agency's point of view. (The Coordinating Group would be comprised of representatives from the agency focal point pool.)
3. Serving as a conduit for effective implementation of the policies and procedures developed by the Information Policy Board and Federal Agency Coordinating Group, as approved by OSTP and the President.
4. Working to improve the coordination of specific STI activities between Federal agencies, especially those whose legislative mandates could result in the duplication of STI systems.

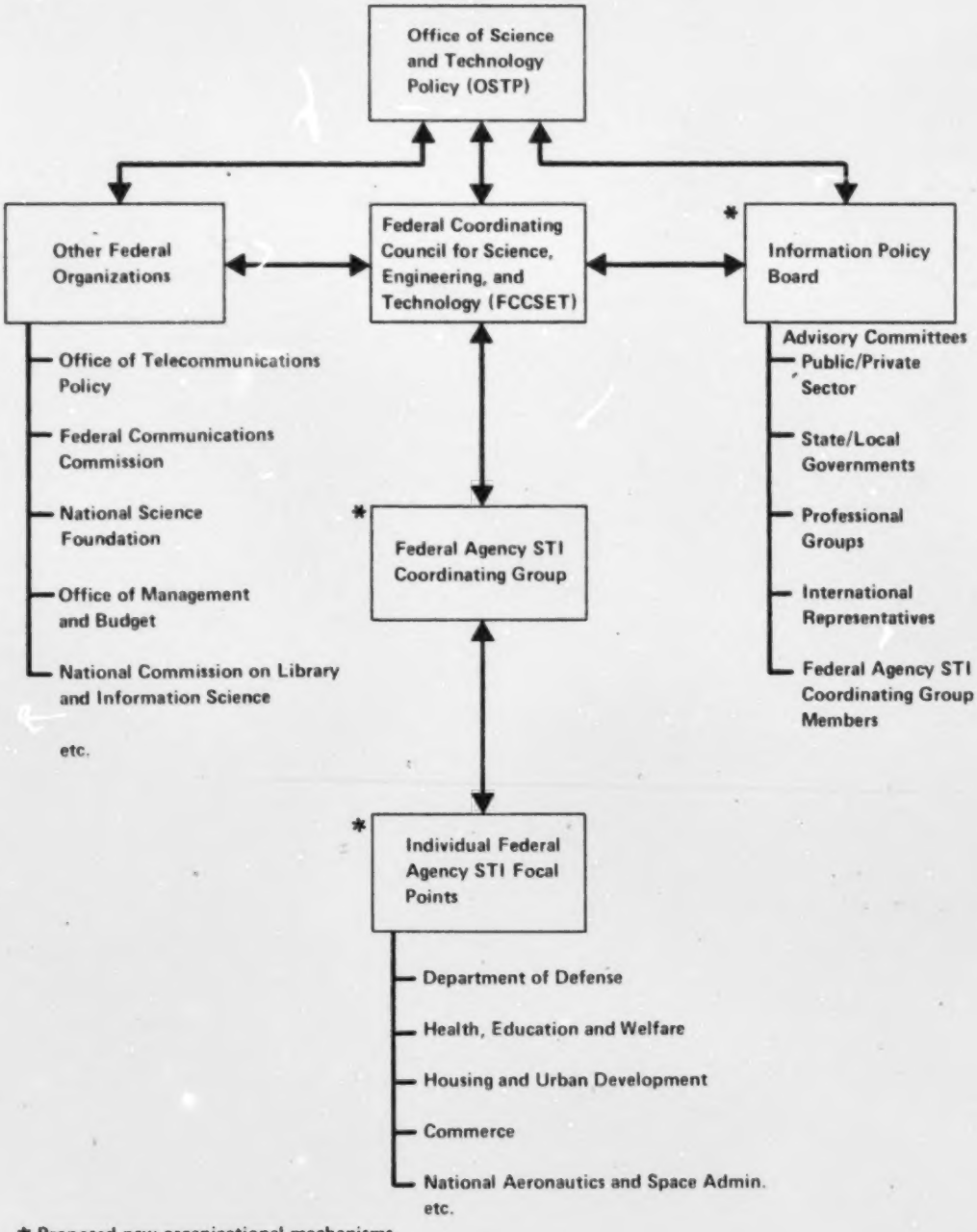
In addition, the focal points could serve as providers of needed information on their STI activities to the Information Policy Board, via the Federal Agency Coordinating Group, and to the President's Committee on Science and Technology as it performs its two year survey.

Federal Agency Coordinating Group

The major function of the Federal Agency Coordinating Group would be to serve as a focal point for coordination and management of Federal STI activities. The major functions which the Group would perform include:

1. Promoting interagency coordination and cooperation.
2. Assessing the nature, scope and

FIGURE 1
PROPOSED ORGANIZATIONAL ACTION OPTIONS--AN OVERVIEW



* Proposed new organizational mechanisms

adequacy of current as well as planned Federal STI systems.

3. Recommending standards and procedures to ensure system compatibility for uniform adoption by Federal agencies.

4. Serving as a forum for managers of Federal STI systems.

5. Developing ways to improve the cost effectiveness and utility of Federal STI services.

6. Acting as a Federal agency spokesman on the Information Policy Board and facilitating the implementation of STI policies established by the OSTP via the Board.

This group would work with the Federal Coordinating Council, established under Title IV of P.L. 94-282, to address issues involving Federal STI activities. It would be made up of persons representing the individual agency focal points as well as representatives from other Federal organizations who have responsibilities in the STI area, e.g., the National Commission on Library and Information Science.

Information Policy Board

The major function of the Information Policy Board would be to develop and recommend STI policies for approval by the President and subsequent adoption by all concerned Federal agencies. The Board would be comprised of representatives from the major Federal agencies involved in government-wide policy research and development relating to STI, including the OSTP, NSF/DSI, and the Office of Telecommunications Policy. The Board would be supported by one or more advisory committees representing the major "stakeholders" in the nation's STI enterprise (i.e., the private sector, state/local governments, professional groups, international groups, and the Federal Agency Coordinating Group representing the Federal Government's viewpoint).

Key functions to be performed by the Board, and its supporting advisory committees, would include:

1. Advising the President, through the OSTP who would chair the Board, on government-wide as well as national policies for the effective management of the nation's STI resources.

2. Reviewing national STI issues and offering recommended solutions and policy options.

3. Recommending national STI policy for U.S. participation in international STI programs.

4. Serving as a central coordinating point in the development of sound public policies and a national information program as well as a bridge between government and the private sector.

5. Addressing system standards and compatibility issues of national concern.

The Board would review national technical information issues facing Federal agencies and the private sector to assure that key problems are not overlooked and to offer recommendations for resolution of such issues. Since the Board's advisory committees would represent all parties concerned with STI, it would also help in the integration of technical information efforts into national information programs.

Special Studies

In addition to the proposed new organizational mechanisms, the need for further study of the STI area has been repeatedly expressed. As part of MITRE's review, the following higher priority needs were identified from the documents analyzed:

1. There are few hard data contained in the documents analyzed during MITRE's review. The OSTP, with its annual reporting requirements as well as its legislative mandate to gather data on significant developments in science and technology, may have a need for the compilation of a body of data on the structure and economic parts of the nation's STI enterprise. The President's Committee, particularly during the early stages of its survey, may also have need for such a body of data. A good start in the compilation of a variety of statistical data on STI is being made by the NSF/DSI.* However, few analytical efforts have or are being performed. The OSTP, or its designated agent, should determine the need for and feasibility of compiling such a body of data and, if determined to be needed, physically compile it for subsequent utilization by OSTP, the survey team, etc.

2. There appears to be a need for the gathering and analysis of information related to a range of special STI issues and concerns. In particular, contemporary information related to the following areas would assist the OSTP and the survey effort in initially dealing with major STI concerns:

   - Conduct a review of current Federal STI policies and procurement practices to determine the relative strengths and weaknesses of such policies/practices, and to prepare recommendations for actions necessary for the eventual development of improved STI policies.
   - Evaluate the effectiveness of the major current Federal STI systems in terms of their perceived importance, ability to meet user needs, cost of operation, extent of coverage, potential for duplication, long-range plans, current operational problems, and suggestions for strengthening and improving Federal STI services.
   - Investigate the issue of the need for further centralization of Federal STI activities (this could be a role of the Federal Agency Coordinating Group). Included could be a detailed investigation of the legislative process in terms of the nature, frequency, scope and eventual cost of STI components authorized under new laws passed within the past 3-4 years and the impact of this process on the efficiency and effectiveness of Federal STI services.
   - The issue of problems with standardization/compatibility of Federal STI systems has been raised by a number of past study groups. An assessment of the present status of, problems with, and recommendations for im-

*For example, the King Research, Inc., study described in Section III of the bibliography.

provements in, standards and/or compatibility of Federal STI systems appears warranted.

These special study efforts by no means encompass the full range of STI issues/problems which the OSTP may wish to address. They do, however, reflect the higher priority concerns of a number of individuals and organizations active in the STI area and, if conducted, should provide the OSTP with valuable data and information on which to come to grips with major STI concerns.

Relation to the President's Committee

The establishment of the new organizational mechanisms could assist the President's Committee during its two year survey by:

1. Serving as primary lines of communication for data collection and review, and as identifiers of points of contact both inside and outside of government.

2. Assisting in the preparation of a plan for conducting the STI aspects of the survey.

3. Reviewing findings and conclusions documented by the survey team and offering suggestions for improving the survey results.

4. Providing technical assistance (personnel, special studies, etc.) to the survey team during actual conduct of the survey.

Similarly, the results of the special studies would assist the Committee by providing contemporary findings on key STI issues and problems. These results should assist the Committee greatly by reducing the time needed to conduct the survey and providing a focus upon which to conduct the survey, i.e., setting priorities for the topics to be addressed. The compilation of a body of data on national STI activities should be of great assistance to the Committee in evaluating its findings and supporting its conclusions. The data pool could also be used by the Information Policy Board, Federal Agency Coordinating Committee, and the Federal Coordinating Council for Science, Engineering and Technology to support their roles in formulating and effecting sound national STI policies.

APPENDIX A
STI REFERENCES IN THE LAW

Public Law 94-282, The National Science and Technology Policy, Organization and Priorities Act of 1976, has two distinctly different parts: (1) Title I, Findings and Declaration of Policy and (2) creation of the Office of Science and Technology Policy (Titles II-IV). Title I consists of a comprehensive statement of the need for and purposes of national priorities for science, engineering and technology. Titles II-IV define the organizational structure of the Office of Science and Technology Policy. There is a Title V in the law; however, this title contains general provisions related to authorizations and repeal of sections of other laws as a result of passage of P.L. 94-282.

Figure 2 provides a diagram of the organizational structure created by the law as well as a summary of the STI-related language contained in the law. In reviewing the law, STI-related references were selected based on: (1) specific reference to "information" or "information systems" and (2) reference to the dissemination of research results, technology transfer, or coordination of Federal resources which includes STI activities.

APPENDIX B
OTHER ISSUES RAISED

In addition to the major STI issues and recommendations presented in the main body of this report, other issues, questions, and points were raised in the documents used for this study. A selected list of these items is provided below.

1. Within the Federal agency structure, there appears to be some difference of opinion as to what documents should be classified as STI. There appears to be a need for a uniform definition to be developed.

2. Information needs of user groups vary. The needs of these groups should be identified and a determination made whether the services provided by Federal agencies match their needs.

3. An examination of the Federal needs for STI from non-Federal sources should be made, including an assessment of the best method(s) of obtaining such data.

4. Federal agencies differ in the prices they charge for the same STI documents. Do current practices provide for equitable charges to users of STI, regardless of where the user obtains the information?

5. Is there an "information crisis" in this country as far as STI users are concerned? Is STI becoming less accessible to the public, special interest groups, the Congress and the like? Are users apprehensive that there are developments of which they are unaware or that they are having difficulty obtaining information?

6. To what extent should the Federal government rely on private information services?

7. To what extent do Federal government procurement policies demonstrate an unfair preference for nonprofit sources?

8. To what extent do the Federal mission-oriented agencies duplicate

FIGURE 2
A SUMMARY OF THE MAJOR STINFO RELATED REFERENCES IN THE NATIONAL SCIENCE AND TECHNOLOGY POLICY, ORGANIZATION AND PRIORITIES ACT OF 1976 (PUBLIC LAW 94-282)

TITLE I

NATIONAL SCIENCE, ENGINEERING, AND TECHNOLOGY POLICY AND PRIORITIES (FINDINGS AND POLICY)

FINDINGS

Foster leadership by enlarging the contributions of man and his universe by making the discoveries of basic science widely available at home and abroad

POLICY

Principles: Develop and maintain a solid base for science and technology including:

- effective management and dissemination of scientific and technological information
- promotion of increased public understanding of science and technology

Implementation: Federal Government is responsible for the systematic transfer of scientific and technological information by such appropriate methods as programs conducted by nongovernmental organizations, including industrial groups and technical societies

Also responsible for the coordination and unification of Federal science and technology information systems and to facilitate the coupling of institutional scientific research with commercial application of the useful findings of science

Scientific and technological activities which may be properly supported exclusively by the Federal Government should be distinguished from those in which interests are shared with State and local governments and the private sector. Among these entities, cooperative relationships should be established which encourage the appropriate sharing of science and technology decision making, funding support, and program planning and execution

Procedures: Federal organizations should establish procedures to insure among them the systematic interchange of scientific data and technological findings developed under their programs

TITLE II

National Science Foundation

Other Federal Agencies

State/Local Governments

National Security Council

Council on Environmental Quality

Council of Economic Advisers

Office of Management and Budget

National Science Board

Working Relationship

OFFICE OF SCIENCE AND TECHNOLOGY POLICY
(Director appointed by the President and up to four Associate Directors)

Member

Domestic Council

- Gather, analyze and interpret timely and authoritative information concerning significant developments and trends in science and technology
- Utilize, to the fullest extent possible, the services, personnel, equipment, facilities and information (including statistical information) of public and private agencies and organizations, and individuals, in order to avoid duplication of effort and expense

TITLE II

INTERGOVERNMENTAL SCIENCE, ENGINEERING, AND TECHNOLOGY ADVISORY PANEL
(10 or more members plus the Director of the NSF, members appointed by the OSTP Director after consultation with State officials)

- Advise and assist the Director in identifying and fostering policies to facilitate the transfer and utilization of research and development results so as to maximize their application to civilian needs

TITLE III

PRESIDENT's COMMITTEE ON SCIENCE AND TECHNOLOGY
(8-14 members to be appointed by the President based on prescribed qualifications including one person distinguished in information dissemination)

- Survey the overall context of the Federal science, engineering and technology effort and consider needs for:
  - improvements in existing systems for handling scientific and technical information on a Government-wide basis, including consideration of the appropriate role to be played by the private sector in the dissemination of such information
  - improved methods for effecting technology innovation, transfer and use

TITLE IV

FEDERAL COORDINATING COUNCIL FOR SCIENCE, ENGINEERING, AND TECHNOLOGY
(13 members, one member each from Agriculture, Commerce, Defense, HEW, HUD, Interior, State, VA, Transportation, NASA, NSF, EPA, and ERDA)

- Achieve more effective utilization of the scientific, engineering and technological resources and facilities of Federal agencies, including the elimination of unwarranted duplication

and disrupt the discipline and market-oriented services of the professional societies and private firms?

9. Is the current Federal emphasis on information science research and development sufficient to meet near-term and long-term national needs?

10. Should the Federal government increase or decrease its marketing of STI?

11. Should technical organizations generating STI with Federal support be held accountable for its use?

12. How realistic is it to impose some sort of uniform system of STI control/coordination throughout the Executive Branch?

13. What should be the relationships between national STI policy, Federal STI policy, science policy in general and information policy in general?

14. What should be the role of other levels of government, the private sector, and other interested parties in the development of national and Federal STI policy?

15. What incentives should be developed to achieve and ensure voluntary cooperation and coordination of the nation's STI systems?

16. The basic functions performed by Federal agencies regarding STI (i.e., preparing source material, collecting and cataloging such information, and packaging and disseminating such information) need to be studied to determine if:

    - Each function is necessary and distinct from the others.
    - Duplication can be eliminated.
    - Adequate coordination exists between agencies.
    - Centralization of some or all of these functions would be better than decentralization.
    - The laws in existence complement each other or conflict.

BIBLIOGRAPHY
and
GLOSSARY

BIBLIOGRAPHY

As part of MITRE's analysis of the scientific and technical information (STI) aspects of Public Law 94-282, a literature review was performed. The review resulted in the identification of a variety of past national studies, legislative documents, journal articles and "white papers". A total of 95 document references were identified. Some of these documents do not deal with STI at all (especially those forming the legislative history of the law), but are important insofar as an understanding of the events and circumstances leading to final passage of the law is concerned. Other documents deal with STI in depth while still others deal with it only on a cursory level.

Accordingly, this bibliography is structured to reflect the differences in the treatment of STI by these documents. Primary documents (those dealing with STI in depth and which formed the basis for MITRE's analysis) are described separately from "other" documents, and legislative documents are described separately from non-legislative ones.

The bibliography thus consists of four main sections as follows:

I — Primary Non-Legislative Publications
II — Primary Legislative Publications
III — Other Non-Legislative References
IV — Other Legislative References.

Sections I and II provide an abstract for each document. The references included in these sections are in order according to date of publication, beginning with the most recent. The references provided in Section III are subdivided into two categories: (1) reports, papers and other documents and (2) articles. Within the reports and papers subcategory, the references are provided in alphabetical order according to author and date of publication (most recent first) within author grouping. Within the articles subcategory, the references are provided in date of publication order, most recent first. The references in Section IV are in alphabetical order according to author and in publication date order (most recent first) within author grouping.

In addition to the bibliographic references, MITRE also reviewed recent laws passed by Congress and selected examples of those laws that contain STI components. These references are provided in Section V in date of passage sequence, most recent first. (They represent selected examples of laws passed, not a complete listing.)

A list of abbreviations and acronyms used in the bibliography is provided in the attached Glossary. An index to the bibliography is provided below.

Page

SECTION I: PRIMARY NON-LEGISLATIVE PUBLICATIONS 29
Becker Report 29
Auerbach Associates Report 29
GAO-NTIS Report 31
Chartrand Report 32
NCLIS Report 33
Burchinal Report 34
Greenberger Report 35
GAO-SSIE Report 36
SATCOM Report 37
Knox Report 37
Weinberg Report 39
Crawford Report 40
Baker Report 40

SECTION II: PRIMARY LEGISLATIVE PUBLICATIONS 42
Public Law 94-282 42
House Report 94-595 43
House Hearings Report No. 15 44
House Committee Print Serial C 45
House Committee Print Serial S 46

SECTION III: OTHER NON-LEGISLATIVE REFERENCES 47
Reports, Papers and Other Documents 47
Articles 53

SECTION IV: OTHER LEGISLATIVE REFERENCES 56
General 56
House 56
Senate 59

SECTION V: SELECTED LAWS 61

SECTION I
PRIMARY NON-LEGISLATIVE PUBLICATIONS

1. Joseph Becker, *A National Approach to Scientific and Technical Information in the United States*, Prepared for the National Science Foundation, Division of Science Information, July 4, 1976, 62 pages.

   The purpose of this report is to articulate the Federal Government's responsibilities in providing for the dissemination of STI. It is one of four related studies sponsored by the NSF/DSI as part of a systematic review of its research funding programs. The other three reports deal with the past impact of NSF/DSI research programs, the current research priorities of professionals in the field of science information, and science information needs in light of forecasted technological and social change. In addition to this report, this study also prepared eight internal working papers which provide background information in support of the study's conclusions and a 25-minute color film, "Science Information and Science Policy."

   The recommendations presented in this report include the need for:

   - A locus of responsibility for making science information policy at the national level. That is, the establishment of a national science information policy-making body in the Executive Branch of the Federal Government.
   - A dynamic, Federally funded research and development program (strengthening and reorienting NSF's Division of Science Information research programs to support efforts leading to the development of improved mechanisms for sharing STI). This recommendation calls for the NSF/DSI to perform national research and coordination responsibilities for STI.
   - A voluntary organizational mechanism for coordinating STI activities in the public and private sectors. Namely, the creation of an Institute under OSTP auspices with which STI organizations in the public and private sectors can voluntarily affiliate.

2. Auerbach Associates, Inc., *DDC 10 Year Requirements and Planning Study, Volume I: Executive Summary*, Prepared for the Defense Documentation Center, Alexandria, Virginia, June 13, 1976, 68 pages (AD-A024700).

   This report summarizes the results of a study to assess both current and future defense research, development, test and evaluation (RDT&E) community needs for the Defense Documentation Center (DDC). Volume I represents one report of a seven part total documentation package (the

other six parts are identified in Section III). The primary objectives of this study were to:

- Identify and document the STI and RDT&E management information requirements of the DOD RDT&E community for the 1978-1988 time frame.
- Identify user problems with acquisition and application of STI/RDT&E management information provided by DDC or other Government or non-Government sources.
- Evaluate DDC's internally established long-range objectives in relation to the study findings.
- Formulate a definitive set of time-phased developmental efforts to satisfy user population information requirements during 1978-1988 and to rectify problem areas identified.
- Describe DDC's role in the 1978-1988 STI and RDT&E management information community.

The study encompassed a survey of users and potential users of DDC, a survey of 14 other Federal STI agencies, a literature review, and a technology assessment performed by a series of expert panels. In addition, DDC's plans were reviewed and evaluated. Major findings of the study were:

- Complete electronic control of information processing operations is desirable, although the feasibility of such control is questioned by the experts. Evolving computer technology offers the potential for complete data control for retrieval purposes.
- Batch processing of large-scale, centralized files will be an important mode of operation for the information community; however, on-line, interactive systems are becoming increasingly attractive.
- Microform will be the prime storage medium for large bibliographic files for at least the next decade.
- Frequent and intensified cooperative efforts are forecast as desirable and feasible, particularly among agencies with complementary capabilities.
- Events relating to standardization are regarded among the most important and as most desirable and feasible. The major information agencies acknowledge the value to be derived from development and adoption of universal information processing standards.
- Localized facilities are expected to be a vital component of information-providing organizations for the forseeable future. Large processors must

function with a structure that permits and encourages smaller or more specialized information agencies to deal directly with users.

- Cost factors are not inherent barriers to advancing information technology. Downward costs are forecast because of increased production and more widespread use of digital technologies; communications costs will also drop.
- Both R&D funding and operating costs for Federal STI services will require at least partial subsidy in the future. Efforts to achieve total cost recovery are reviewed as undesirable and unfeasible.
- The overwhelming majority of users is unaware of the costs of information services. On the whole, users appear willing to pay a little more for improved information services tailored to meet their precise needs.
- Marketing efforts have had minimal success in those information agencies where they have been employed.

In addition to the above findings, the study also provides, in detail, many other findings related specifically to DDC's operation. Of particular importance is the finding that there is a growing trend toward information interdependence. Coordination and standardization among non-DOD STI agencies will allow users to query many potentially useful sources from a single point. The report concludes that DDC should, therefore, play an active role in coordination of non-DOD information agencies.

3. General Accounting Office, Comptroller General of the United States, *Observations on Collection and Dissemination of Scientific, Technical, and Engineering Information: National Technical Information Service, Department of Commerce*, Prepared for the Subcommittee on Domestic and International Scientific Planning and Analysis, Committee on Science and Technology, House of Representatives, by Elmer B. Staats, Comptroller General of the United States, March 19, 1976, 9 pages (GGD-76-66).

   This report provides the results of a limited examination of the National Technical Information Service (NTIS), particularly its mission as a clearinghouse for STI (i.e., its data collection process and the adequacy of information received). The products and services provided by the NTIS were not examined. A total of five Federal agencies were surveyed (ERDA, NASA, DOD, DOL and DOA) and discussions were held with representatives from GSA, OMB and the NTIS itself.

   A major finding of the review was that some Federal agencies are not providing documents to NTIS and only a limited amount of information is obtained from non-Federal agencies. In particular, the Departments of

Labor and Agriculture are not submitting all of their documents to NTIS. NTIS officials indicated that this same problem occurs for DHEW, DHUD and the SEC.

The primary reasons given for non-submittal were: (1) NTIS legislation does not require it; (2) legislation of the Federal agencies involved authorizes them to maintain their own STI systems; and (3) the fee charged by NTIS to input documents received in non-machine readable form acts as a deterrent. Also, very little information is obtained from non-Federal sources. NTIS has concentrated its collection efforts almost exclusively within the Federal Government. The reasons given for this lack of information were: (1) sources are reluctant to pay the fees charged by NTIS and (2) in many instances the sources do not wish to have their material made public.

The report does not offer any recommendations, but does list five observations on other issues related to STI collection and dissemination which may need further study:

- The need for a uniform definition of what constitutes STI documents.
- Review of the different prices charged by Federal agencies for the same document.
- Further study of the three major functions performed by Federal agencies regarding STI (preparing source material, collecting and cataloging information, packaging and disseminating).
- Further study of the needs of different user groups.
- Review of the need for and sources of non-Federal STI within NTIS.

The report also provided certain data concerning NTIS's operation. Of the 63,873 documents input during 1974, 99% were from Federal agencies (33%-DOD; 21%-ERDA; 13%-NASA; 32% all others) and 1% were from non-Federal sources. In terms of revenue, NTIS received $12.8 million in FY75 which represents almost a 50% increase from the $8.3 million received in FY73. At the end of FY74, NTIS had collected about 834,000 STI literature titles.

4. U.S. Congress, Senate, Committee on Labor and Public Welfare, Special Subcommittee on the National Science Foundation, *Federal Management of Scientific and Technical Information (STINFO) Activities: The Role of the National Science Foundation*, 94th Congress, 1st Session, July, 1975, 104 pages, Committee Print (Prepared by Robert L. Chartrand and Rosemary A. Chalk, Library of Congress, Congressional Research Service).

The purpose of this study was to examine the role of the Federal Government, particularly the National Science Foundation (NSF), in managing and monitoring the scientific and technical information activities in both the public and private sectors. The focus of the report is to provide a concise overview of the subject matter rather than a detailed analytical study.

The report provides a review of the major developments in STI over the past two decades and an analysis of the role performed by the NSF in encouraging and funding selected STI systems and services. It includes a retrospective look at the range of studies, policy-level decisions, and organizational actions affecting the evolution of the STI community in the period 1950-1975. A summary of Congressional efforts to stimulate and support STI services is also presented. The main body of the report concludes with a summary of findings including:

- There is a widely alleged lack of leadership in STI activities which suggests strongly that the management of a precious resource (STI) is fragmentary and questionable at best.
- The consensus of previous studies was that a strong coordinating mechanism is necessary to implement policies which serve the needs of all components of the STI community. The report defines the role to be played by such a mechanism.
- There appears to be a need for further study of specific STI areas and the report identifies several questions as candidates for additional consideration.

In addition, the report provides a series of appendices containing selected background information. The appendices include:

- A chronology of selected events in STI (1950-1974).
- Synopses of major reports (Baker, Crawford, Weinberg, COSATI, SATCOM, and Greenberger).
- Actual and estimated program obligations for the NSF, Office of Science Information Service (now the Division of Science Information) from 1953-1976.
- Paper presented by Dr. Lee G. Burchinal at the 37th annual meeting of the American Society for Information Science in October, 1974.
- A bibliography and project contact list.

5. National Commission on Libraries and Information Science, *Toward A National Program for Library and Information Services: Goals for Action*, May, 1975, 99 pages.

This report presents the results of the Commission's efforts, beginning in June of 1973, to describe a broad outline of a national program for library and information services. It provides an indepth review of the need for such a national program, a review of current problems of libraries in the United States, some concerns of the private sector in the establishment of such a national program, and an overview of current trends towards cooperative action in national information networks, including barriers to such cooperative action.

An outline of the proposed national program is presented which encompasses eight program objectives:

- Ensure that basic minimums of library and information services adequate to meet the needs of all local communities are satisfied.
- Provide adequate special services to special constituencies, including the unserved.
- Strengthen existing statewide resources and systems.
- Ensure basic and continuing education of personnel essential to the implementation of a national program.
- Coordinate existing Federal programs of library and information service.
- Encourage the private sector to become an active partner in the development of the national program.
- Establish a locus of Federal responsibility charged with implementing the national network and coordinating the national program under the policy guidance of the Commission.
- Plan, develop and implement a nationwide network of library and information service.

A detailed discussion of the nationwide network concept is provided including definition of major Federal responsibilities, organizational relationships and supporting responsibilities, proposed legislation and funding.

6. President's Science Advisor, Ad Hoc Task Group on Federal Agency STI Review, *A Review of Federal Agency Responses to Selected Recommendations Made in Three Major Scientific and Technical Information Reports*, April 30, 1975, 35 pages (Review directed by Lee G. Burchinal, Head, Division of Science Information, National Science Foundation).

This report documents the results of a survey of 15 Federal agencies concerned with how these agencies had responded to the recommendations made in three national STI studies (Weinberg, SATCOM and Greenberger). The agencies involved included the NTIS and SSIE as well as 13 other agencies that fund 95% of all Federally sponsored R&D, namely: USDA, DOD, EPA, ERDA, HUD, DOL, NASA, NOAA, NBS, DOT, NSF, NIH and VA.

The responses to the 15 recommendations considered most relevant to current Federal STI activities are documented in terms of the percentage of the agencies that support each recommendation. In addition, a discussion of the comments solicited and received from the agency representatives is presented. Of particular relevance were the following findings and conclusions:

- Most agencies have not implemented recommended agency-wide STI management procedures although the majority have moved in the directions urged by the three studies.
- For the Government as a whole, the gap between recommended and current practice has widened since the publication of the three studies (the most recent report was published in 1972).
- Recommendations calling for the establishment of a Federal/private STI advisory body have not been implemented.

A general conclusion reached by the review is that current management of Federal STI programs is strongest at the operating level and declines significantly at the agency-wide, government-wide, and broader national (Federal/private) levels. The review does not include the offering of any recommendations.

7. National Science Foundation, *Making Technical Information More Useful, The Management of a Vital National Resource*, A Report for the Chairman of the Federal Council for Science and Technology submitted via the Director of the National Science Foundation, June, 1972, 41 pages (Martin Greenberger, et al.).

The purpose of this study was to perform an outside examination of the organization, programs, and possible roles of the Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology. The study groups investigated, in a broad sense, the technical information programs and policy issues both in and outside of government, including the impact of new developments in computer and communication technology.

The major finding of the study was that existing mechanisms for achieving greater operational coordination among agencies in the technical information

field, especially those dealing with broad policy issues, is needed. Recommendations made by this study include:

- Establishment of an Information Policy Board and a Federal Technical Information Committee to replace the existing mechanisms.
- Development by the NSF of a high-powered technical and analytical resource, under a working arrangement with NBS, to provide consulting services, conduct analytical studies and serve as a repository of expertise on STI.

The report delineates the functional responsibilities of the three mechanisms proposed and offers general suggestions regarding the administrative framework in which the mechanisms could operate. It stresses the need for prompt implementation of the recommended mechanisms.

8. General Accounting Office, Comptroller General of the United States, *Effectiveness of Smithsonian Science Information Exchange Hampered by Lack of Complete, Current Research Information*, A Report to the Congress by Elmer B. Staats, Comptroller General of the United States, March 1, 1972, 33 pages (B-175102).

The purpose of this review was to assess how the SSIE is run and how Federal agencies contribute to, and use, its services. The intent of the study was to examine the effectiveness of the SSIE and review policies, procedures and practices of selected agencies in participating in the Exchange. Discussions with officials in OMB and OST regarding their policies for agency cooperation with the Exchange were also held.

The major findings of the review include:

- Many agencies are not using the SSIE to the fullest extent because of claims that its data bank is not current or complete. At the same time the ability of the Exchange to provide current information is hampered due to a lack of information from the agencies.
- Government agencies are not required to submit complete information on their R&D programs to the Exchange.
- A significant decline in the use of the Exchange between 1968 and 1970 was attributed, in part, to the charges levied for doing information searches of the SSIE's files. Also, agencies used the Exchange less frequently because its incomplete and obsolete data was of limited utility.

The report concluded that the OMB should evaluate the role of the SSIE

and, if it is found that the SSIE should be continued, Federal agencies should be required to submit pertinent, timely information about their research programs to the Exchange. The report also identifies several agency actions and unresolved issues which need further consideration.

9. National Academy of Sciences–National Academy of Engineering, Committee on Scientific and Technical Communication, *Scientific and Technical Communication: A Pressing National Problem and Recommendations for its Solution,* June, 1969, 322 pages, NAS Pub. No. 1707, (Robert W. Cairns, et al., "SATCOM" report).

   This report documents the results of a three year study to investigate the present status and future requirements of the scientific and engineering communities with respect to the flow and transfer of information. Included in the study was a survey of the complex interrelationships of Federal and privately operated information activities and an assessment of the most effective means of increasing the efficiency of information transfer and use. A total of 55 recommendations are set forth in the report. These suggestions are considered essential to the effective communication of STI. This report also includes considerable background material, including a technical presentation of the various methods used in disseminating STI.

   The study report reflects a firm conviction that generators and users of STI must assume increasing responsibility for the more effective transfer of such information. A major recommendation of the report is the establishment of a Joint Commission on Scientific and Technical Communication, responsible to the Councils of the two Academies (NAS-NAE). The recommendations given in the report are grouped into five categories:

   - Planning, coordination and leadership at the national level (11 recommendations).
   - Consolidation and reprocessing services for the user (16 recommendations).
   - The classical services (16 recommendations).
   - Personal information communication (2 recommendations).
   - Studies, research, and experiments (10 recommendations).

   Each recommendation is presented in detail with supporting technical information provided as necessary. A synopsis of the report was published as a separate document (same title preceded by "A Synopsis").

10. Federal Council for Science and Technology, Committee on Scientific and Technical Information, *Recommendations for National Document Handling Systems in*

Science and Technology, November, 1965, 20 pages (William T. Knox, et al.) (AD 624560).

The purpose of this study was to develop a conceptual framework for an improved national network of information systems in science and technology. It was designed to serve as a beginning of an attempt to develop guidelines for planning so that the information activities within each Federal department and agency might be developed in a coordinated, nonduplicative manner.

The report provides background material, including a summary of three previous studies (Baker, Crawford and Weinberg) as well as the basic assumptions underlying the recommendations provided. General management requirements of a national document handling system are delineated as well as a list of system requirements which form the basis of the report's conclusions and recommendations. A list of conclusions is provided as well as four recommendations:

- The OST should accelerate its efforts leading to the development of a national network of information and document handling systems, including the clarification of areas of responsibility among Federal agencies.
- The OST should develop a comprehensive, coordinated, national program including establishment of one or more national libraries; develop policies concerning the legislative basis for document and information services in or sponsored by the Federal Government; propose or endorse legislation necessary to enable the Federal Government to assume responsibility for ensuring effective information and document handling services.
- The OST, in collaboration with appropriate Federal agencies, should encourage the private sector to formulate document handling plans and programs for its consideration in the development of the national network.
- The Committee on Scientific and Technical Information (COSATI) should recommend actions in the areas of: development of a coordinated plan and criteria for Federal support of experiments in information science technology; development of standard procedures for processing documents; development of guidelines for cost and budgetary analyses and control; development of education and training curricula for operators and users; and the development of policies for acquisition, dissemination and translation of foreign documents and the dissemination of U.S. produced information to foreign countries and organizations.

11. President's Science Advisory Committee, *Science, Government and Information—The Responsibilities of the Technical Community and the Government in the Transfer of Information*, January 10, 1963, 52 pages (Alvin M. Weinberg, et al.).

This study reviewed the transfer of information processes within research and development activities and offers approximately 200 recommendations. The recommendations reflect a set of principles upon which subsequent action might be based rather than a plan for dealing with STI concerns. The study found that STI is an inseparable part of R&D and that the technical community generally must devote a larger share of its time and resources to the discriminating management of the ever-increasing technical record. Doing less, according to the report, will lead to fragmented and ineffective science and technology. The suggestions are broken down into those for the technical community and those for government agencies.

A background discussion of the nature of the information problem in the United States, the attributes and problems of the information transfer chain, and of information systems in general is provided. Suggestions for the technical community include:

- Authors must accept more responsibility for information retrieval.
- Unnecessary publications should be eliminated and American technical books must be improved.
- Centralized depositories are an attractive possibility and more and better specialized information centers are needed.

Suggestions for the Federal Government agencies include:

- Each Federal agency concerned with science and technology must accept responsibility for information activities in fields that are relevant to its mission. Each agency must devote an appreciable fraction of its talent and other resources to support of information activities.
- To carry out these broad responsibilities each agency should establish a highly placed focal point of responsibility for information activities that is part of the R&D arm, not of some administration arm, of the agency.
- The entire network of Government information systems should be kept under surveillance by the Federal Council for Science and Technology and problems of scientific information should be given continued attention by the President's Science Advisory Committee.

12. President's Science Advisor, Ad Hoc Task Group on Federal Agency STI Review, *Scientific and Technological Communication in the Government,* A Task Force Report to the President's Special Assistant for Science and Technology, April, 1962, 81 pages, AD 299545 (J.H. Crawford, et al.).

This report documents the results of a review of STI activities operating within the Federal Government. The intent of the study was to develop a more comprehensive understanding of the STI needs of R&D programs, to assess the strengths and weaknesses of existing and planned STI activities, and to determine whether there is a need for improved procedures and organization for the handling of STI. The first part of the report discusses the urgency of scientific and technological problems the Government is facing, the nature of the information needed by scientists, technologists, and administrators of R&D, and the basic approach employed by the study team. Following is an examination of the existing situation, recommended improvements, and suggestions for organizational changes to implement the improvements. Also included is a plan for an orderly transition from the existing situation to the recommended one; problems associated with restrictions on the flow of information are also briefly discussed and reference materials are provided in appendices.

This report made two major organizational recommendations designed to improve the flow of recorded information within the Federal Government:

- Establishment of a central authority to define objectives of government information programs, plan, develop and guide the organization of government STI activities, develop criteria for effective operation of government-wide STI systems, review and evaluate the performance of Federal agency STI systems, and to provide systems research, engineering and development support.
- Establishment in each Federal agency funding R&D, an office for exercising agency-wide direction and control of information activities.

The emphasis of these recommendations was on engineering, organizational and managerial changes in Federal STI activities rather than improvement of specific systems.

13. President's Science Advisory Committee, *Improving the Availability of Scientific and Technical Information in the United States (Panel Report),* December 7, 1958 (William O. Baker, et al.).

This study was based on the conclusion that progress in science is dependent upon the free flow of scientific information and that publication of information is absolutely essential. The report recommended establishment of

a Federal science information service, to assist and coordinate existing programs of government agencies and private organizations for short-term relief, and to encourage and support a long-term R&D program. The report recommended that the National Science Foundations Office of Science Information Service (now the Division of Science Information) expand its program to constitute such a Science Information Service that would serve to aid and coordinate existing government and private efforts.

The report was included in the hearings held on "Missile Development and Space Sciences", by the House Committee on Science and Astronautics in February, 1959. A copy of the report could not be obtained during the project period; the abstract provided above was taken from the Chartrand and Knox reports (numbers 4 and 10, above).

SECTION II
PRIMARY LEGISLATIVE PUBLICATIONS

1. U.S. Congress, *National Science and Technology Policy, Organization and Priorities Act of 1976, Public Law 94-282,* 94th Congress, H.R. 10230, May 11, 1976, 15 pages.

   The law references STI or has language related to the dissemination of research results in 11 of its 45 major sections. A diagram of the law, including the applicable STI-related language, is provided in Appendix A of this report. A list of the applicable STI-related Title/Section references included in the law is as follows:

   - Title I — Section 101 (b)(1)
     Section 102 (a)(5)(C) & (E)
     Section 102 (b)(2)
     Section 102 (b)(4)
     Section 102 (c)(10)

   - Title II — Section 205 (a)(3)
     Section 205 (b)(1)(B)
     Section 208 (a)(4)

   - Title III — Section 303 (a)(2)
     Section 303 (1)(4)

   - Title IV — Section 401 (e)(3)

   There is a Title V in the law; however, this title only deals with general provisions (authorization and statutory repeal).

   Most of the STI-related language in the law is given in Title I, Findings and Declaration of Policy. In particular, "improved management of information" is stated as one of the basic principles of a national science policy. Further, the implementation of such a principle requires that the Government ensure transfer of technology information to users and facilitation of a close coupling of industry with academia in the application of scientific findings. The implementation also includes cooperative scientific and technological relationships with states, local governments, and the private sector.

   Procedures for effecting the policy principles includes procedures for full exchange of technological data and findings among Federal agencies. Titles II, III and IV establish the Office of Science and Technology Policy including an Intergovernmental Science, Engineering, and Technology Advisory Panel, a Federal Coordinating Council for Science, Engineering, and Technology, and a

President's Committee on Science and Technology. One of the major functions of the Committee is, as part of its survey effort, to determine needs for improvement in information systems, technology assessment, and technology innovation, transfer, and use.

The thrust of the policy principles in the law, as regards STI, is to recognize the importance of the STI mechanisms now in operation as part of a national technical information system, and to define its goals and purposes, and to acknowledge the Federal Government's responsibility for participating in it. Such participation is defined as including: the generation and supply of information from Federal programs of science and technology, the funding or support of various parts of the total national system, and the encouragement of cooperative working relationships among the different parts of the system. The organization established by the law, however, provides no specific mechanisms for dealing with STI, with the exception of the Committee which will address STI issues as part of its two year survey.

2. U.S. Congress, House, Committee on Science and Technology, *National Science and Technology Policy and Organization Act of 1975,* Report Together With Additional Views, 94th Congress, 1st Session, October 29, 1975, Report No. 94-595, to accompany H.R. 10230, 50 pages.

This report provides an excellent summary of the background and purpose of H.R. 10230 (this bill became Public Law 94-282 in May of 1976). In particular, it provides an explanation of the legislative history of the bill, including a discussion of its STI aspects as well as its forerunner, H.R. 4461. Topics covered include: Explanation of the bill; History of the legislation (7 page narrative discussion); Summary of the testimony received during the June, 1975 hearings on H.R. 4461; Rationale for the bill (by Title); Sectional analysis of the bill; Committee actions and committee views summary; and Administration views. An addendum to the report (4 pages) describes additional views of the Honorable George E. Brown, Jr.

Of all the documents dealing with the law's legislative history, this report best describes the Committee's intent with respect to STI. The Committee concluded that: "Among the issues seriously considered in H.R. 4461, and which need further in-depth evaluation are. . . (b) an improved entity for handling federally sponsored scientific and technological information." STI references in this report are listed as follows:

- Page 17, "D. Consolidation of Federal Information Dissemination and Utilization Activities (Title IV of H.R. 4461)", entire section.
- Page 22, last paragraph, item "(b)".

- Page 24, "Scientific and Technological Information", entire section.
- Page 32, "Subsection (b), item number 2", entire paragraph.
- Page 34, "item number 11", entire paragraph.
- Page 39, "Committee Views, Scientific and Technological Information Dissemination and Utilization", entire section.

As a final note, the views expressed by the Honorable George E. Brown, Jr. were directed towards improving planning for science and technology; no STI-related views were expressed.

3. U.S. Congress, House, Committee on Science and Technology, *The National Science Policy and Organization Act of 1975, Hearings*, 94th Congress, 1st Session, June 10, 11, 17, 19 and 23, 1975, on H.R. 4461 and H.R. 7830, Committee Print No. 15, 1041 pages.

This report reflects the only instance where, in the legislative history of P.L. 94-282, a detailed discussion of STI is documented. These hearings were related to H.R. 4461 and, in particular, to Title IV of that bill which called for the establishment of a Science and Technology Information and Utilization Corporation. A total of 16 witnesses appeared before the Committee and an additional 29 written statements were submitted. Of these 45 sources, 20 specifically addressed the STI area and, of these 20, seven provided significant comments on STI. These seven included Drs. Stever, Herring, Branscomb, Dees and Gilmont and the written statements of the Information Industry Association and the National Federation of Indexing and Abstracting Services.

Approximately 100 pages of the hearings include comments related to Title IV of the bill. For the most part, the testimony is focused on Title IV rather than on STI concerns in general. The comments were analyzed and the results of the analysis is provided in the front of this report. The consensus of opinion expressed during the hearings on STI is as follows:

- 17 persons provided testimony on the pros and cons of Title IV. Of these, 11 were against the concept, 5 were in favor of it and 1 did not clearly indicate either for or against.
- 10 persons commented to the effect that further study of ways of improving/strengthening Federal STI activities is needed. Of these, 9 were in agreement with this statement and one was not.
- 9 persons commented that STI issues are very important and need to be addressed (there were no dissenting opinions).

- 8 persons commented on the fact that Federal STI activities need to be strengthened and/or improved. Of these, 7 were in agreement and 1 was not in agreement.
- 6 persons suggested that Federal STI activities should remain decentralized, 1 stated that they should not.
- 6 persons commented on the need for a Federal STI policy body or coordinating agency. Of these, 5 said yes and 1 indicated maybe.

From the above summary, it is clear that the hearings did not specifically deal with major STI issues facing the new Office of Science and Technology Policy in any great depth. This report is, however, the only document identified which includes specific discussion of STI concerns, from persons other than the sponsoring Committee, during the legislative process leading up to the passage of P.L. 94-282.

In addition to the testimony, this report also includes a handbook for committee members on H.R. 4461 (Appendix III, page 865) and the results of a survey of the members of the National Academy of Engineering and National Academy of Sciences in relation to the Committee's hearings on Federal Policy, Plans, and Organization for Science and Technology (Appendix IV, page 947). The handbook discusses the objectives of Title IV (page 915) as well as some pros and cons of Title IV (page 924). A list of suggested questions for witnesses regarding Title IV is also provided in the handbook (page 930).

4. U.S. Congress, House, Committee On Science and Technology, *A Proposed National Science Policy and Organization Act of 1975,* Prefaced by Olin E. Teague, Chairman, 94th Congress, 1st Session, 1975, Committee Print, Serial C, 61 pages.

This report describes the rationale for H.R. 4461, the text of the proposed Act itself, a section-by-section analysis of the proposed bill, a chronology of Federal Executive Branch science organization from 1787-1975, and a list of selected references re Federal science policy and organization from 1951-1975.

The preface provided by Chairman Teague, page 6, describes the rationale for Title IV of the bill, the establishment of a scientific and technology information and utilization corporation. Other STI references included in the report deal with the language of Title IV; a list of such references is as follows:

- Page 21, "Title IV—Science and Technology Information and Utilization Corporation", entire section.
- Page 30, sectional analysis of Title IV, entire section.

The thrust of Chairman Teague's remarks on Title IV is that STI is recognized by the Congress as a vital part of the whole scientific and technological process which must be efficiently carried out. The reason for the Title is to assure that STI does not gather dust and is put to use as promptly and as efficiently as possible. According to Chairman Teague, "abundant evidence exists which shows that STI management today is resulting in wasteful neglect of available knowledge and the funding of needless research to repeat findings already in the literature."

The chronology of predominantly legislative action (page 33) re science organization, provides an excellent summary of the evolution of Federal concern related to scientific and technical matters. The selected references list is also useful in tracing the major Congressional documents dealing with science and technology policy.

5. U.S. Congress, House, Committee on Science and Astronautics, Subcommittee on Science, Research, and Development, *Toward A Science Policy for the United States*, 91st Congress, 2d Session, October 15, 1970, Committee Print, Serial S, 115 pages.

This report is primarily concerned with the results of the Committee's inquiry into establishment of a national science policy. It provides a rationale for a national science policy and recommendations for subsequent action. Part II of the report provides a summary of hearings held on a national science policy while Part III provides a narrative description of the history of Federal science policy from 1787-1970.

There are two specific references to STI included in the report. The first ("Communications and Information", page 17) recommends the establishment of a real-time management information system for coordination and management of the Federal science research and development enterprise. This recommendation resulted from the Committee's frustration in attempting to obtain recent data regarding Federal expenditures for R&D. The second reference ("With Regard to Science-Information Systems and Techniques. . .", page 18) recommends that the Smithsonian Science Information Exchange be given an Executive mandate to proceed with research leading to compatible information systems, with essential backup from COSATI.

SECTION III
OTHER NON-LEGISLATIVE REFERENCES

Reports, Papers and Other Documents

1. J. Georges Anderla, *Information in 1985: A Forecasting Study of Information Needs and Resources*, Organization for Economic Cooperation and Development, 1973.

   Copy not obtainable.

2. Auerbach Associates, Inc., *DDC 10 Year Requirements and Planning Study, Volume II: Technical Discussion, Bibliography and Glossary*, Prepared for the Defense Documentation Center, Alexandria, Virginia, June 13, 1976 (AD-A024701).

   See item no. 2 in Section I.

3. Auerbach Associates, Inc., *DDC 10 Year Requirements and Planning Study, Survey Results Report*, Prepared for the Defense Documentation Center, Alexandria, Virginia, March 14, 1976. (AD-A022304).

   See item no. 2 in Section I.

4. Auerbach Associates, Inc., *DDC 10 Year Requirements and Planning Study, Expert Panel Review Report*, Prepared for the Defense Documentation Center, Alexandria, Virginia, December 31, 1975 (AD-A022303).

   See item no. 2 in Section I.

5. Auerbach Associates, Inc., *DDC 10 Year Requirements and Planning Study, Interagency Survey Report*, Prepared for the Defense Documentation Center, Alexandria, Virginia, December 12, 1975 (AD-A022302)

   See item no. 2 in Section I.

6. Auerbach Associates, Inc., *DDC 10 Year Requirements and Planning Study, Literature Survey Report*, Prepared for the Defense Documentation Center, Alexandria, Virginia, October 17, 1975 (AD-A022301).

   See item no. 2 in Section I.

7. Auerbach Associates, Inc., *DDC 10 Year Requirements and Planning Study, Survey Plan*, Prepared for the Defense Documentation Center, Alexandria, Virginia, August 15, 1975 (AD-A022300).

See item no. 2 in Section I.

8. Lee G. Burchinal, "Toward National Coordination of Scientific and Technical Information Through Research and Development," A Paper Presented at the 37th Meeting of the American Society of Information Science, Atlanta, Georgia, October 15, 1974, 14 pages.

   Discussion of current problems facing science communications, new directions being taken by the NSF/DSI (formerly OSIS) and an outline of a conceptual framework for science information R&D, including goals of the NSF/DSI program.

9. Federal Council for Science and Technology, Committee on Domestic Technology Transfer, *Directory of Federal Technology Transfer*, June, 1975, 203 pages.

   Index of technology transfer programs of 44 Federal agencies.

10. Federal Council for Science and Technology, Committee on Intergovernmental Science Relations, *Public Technology—A Tool for Solving National Problems*, May, 1972 (M. Frank Hersman, et al.), 68 pages.

    STI not specifically addressed.

11. Federal Council for Science and Technology, Task Group on Dissemination of Information, *Recommendations for Improving the Dissemination of Federal Scientific and Technical Information*, November, 1970.

    Copy not obtainable.

12. Federal Council for Science and Technology, Committee on Scientific and Technical Information, *Progress in Scientific and Technical Communication, 1969 Annual Report*, COSATI, 70-3, 1969, 156 pages (PB-193386).

    Describes advances made in the communication of STI in the Federal Government and significant achievements of the Federal agencies as well as panels and task groups of COSATI itself.

13. General Accounting Office, Comptroller General of the United States, *Means for Increasing the Use of Defense Technology for Urgent Public Problems* (Department of Defense, Office of Management and Budget and other Civil Agencies), December 29, 1972, A Report to the Congress by Elmer B. Staats, Comptroller General of the United States, 58 pages (B-175132).

    Includes examples of technology transfer methods plus recommendations for subsequent action as well as agency actions and unresolved issues and matters for Congressional consideration.

14. King Research, Inc., *Statistical Indicators of Scientific and Technical Communication (1960-1980), Volume I: A Summary Report*, Prepared for the National Science Foundation, Division of Science Information, October, 1976.

The NSF's Division of Science Information places major importance on supplying data and statistical indicators that can be used for planning and policy purposes. Thus this study was undertaken in order to develop a system of statistical indicators to portray the direction of scientific and technical communication over the past and into the future. This volume provides an analytical summary of data on STI, beginning with the generation of STI through its use. It includes a description of major indicators and their significance to the field of STI communication. These indicators are addressed to information science administrators, policymakers, and others engaged in the management of STI. All data were obtained from existing and available sources. The study encompassed an extensive analysis of secondary data sources and their strengths and weaknesses in building the system of statistical indicators. A major finding of the study is that the total resources expended in scientific and technical communication in the United States are estimated at $9.4 billion in 1975. This figure includes the costs incurred by authors, publishers, libraries and secondary services, and users in the production and use of scientific and technical books, journals, reports, and other publications. Also, the total resources expended in scientific and technical communication are growing at a faster rate than the Gross National Product. The GNP has grown 177 percent from 1960 to 1974 while the total resources expended for STI communication have increased by 320 percent over the same time period. This growth is particularly pronounced when compared to R&D funding levels. The ratio of STI expenditures to R&D funding levels has increased and, if this trend continues, the proportion of STI resources allocated from R&D funding will compete more and more heavily with other R&D activities.

15. King Research, Inc., *Statistical Indicators of Scientific and Technical Communication (1960-1980), Volume II: A Research Report*, Prepared for the National Science Foundation, Division of Science Information, May, 1976, (PB-254060).

This volume is concerned with the analysis of data leading to the system of statistical indicators described in Volume I, above. It includes a description of the framework leading to the development of the statistical indicators. This volume is of interest to those engaged in research involving communication of STI. It may also be useful to those who are interested in the details of how the system of indicators was derived.

16. King Research, Inc., *Statistical Indicators of Scientific and Technical Communication (1960-1980), Volume III: A Data Appendix to Volume II*, Prepared for the National Science Foundation, Division of Science Information, 1976.

This volume contains the raw data which were collected in the course of the

study. It is of use as a reference tool to those engaged in detailed research in communication of STI.

17. King Research, Inc., *Statistical Indicators of Scientific and Technical Communication (1960-1980), Volume IV: The Status of Journal Publications in the U.S., 1975,* Prepared for the National Science Foundation, Division of Science Information, available October–December, 1976.

    Copy not obtainable.

18. Lavey, Warren G., *Toward A Quantification of the Information/Communication Industries,* A Report of the Program on Information Technologies and Public Policy, Harvard University, Cambridge, Massachusetts, May 20, 1974, 114 pages (P-74-2).

    General discussion of the total information industry in the United States with supporting quantitative data; STI not specifically addressed.

19. Library of Congress, National Referral Center, *Directory of Federally Supported Information Analysis Centers,* Third Edition, 1974, 55 pages.

    This directory was compiled by the National Referral Center and includes a description of 108 Federally supported information analysis centers. The directory provides, for each center, its location, year started, number of staff, mission, scope, holdings, publications, services and qualified users. A subject index is also provided.

20. National Academy of Sciences, Ad Hoc Committee on Science and Technology, *Science and Technology in Presidential Policymaking: A Proposal,* June, 1974, 56 pages (James R. Killian, et al.).

    STI not specifically addressed.

21. National Academy of Sciences, Committee on Scientific and Technical Communication, *Report of the Task Group on the Economics of Primary Publication,* 1970, 250 pages (Conyers Herring, et al.).

    This report describes the present situation of primary journals, a survey of recent trends and problems, and a perspective for general national policies, with special attention given to the immediate future. The goal of this study was to gather relevant data and develop these data into arguments for or against certain policies regarding primary journal publication. The study did not deal with long-range predictions or recommendations in which the characteristics of untested technologies of communication would be involved. Two categories of principal recommendations are offered: (1) national policies for the support of journals

directed largely to government agencies, and (2) suggestions for easing the economic problems of journals directed mainly to publishers or professional societies. An appendix is provided which provides the details of the study including: (1) a discussion of the present situation regarding primary journals, (2) arguments and conclusions leading to the recommendations offered.

22. National Commission on Libraries and Information Science, *Annual Report to the President and Congress, '74/'75,* January 6, 1976, 51 pages (Alphonse E. Trezza, Executive Director).

    This document represents the Commission's fourth annual report to the President and provides a detailed discussion of the Commission's activities for the preceding year. The report is a statutory requirement of Public Law 91-345, as amended by P.L. 93-29, Section 802. It includes a summary of the Commission's report: "Toward A National Program for Library and Information Services: Goals for Action" (see item No. 5 in Section I).

23. National Council of Technical Service Industries, *Reliance on the Private Sector by the Federal Government for Data Processing Services,* November, 1974, 31 pages (White paper).

    Discussion of the Government's experience in using data processing services provided by the private sector, including discussion of Federal policies and issues, and the advantages to using the private sector.

24. National Institutes of Health, Committee on Communications, *A Review of Present Practices of NIH in Disseminating Research Findings to the Public, Health Practitioners, and Research Scientists With Recommendations for Expanded and Additional Systems,* March 7, 1975, 49 pages (white paper).

    Discussion of NIH problems in STI communication plus a plan for action for improving the disseminating of research information.

25. National Science Foundation, Division of Science Information (formerly the Office of Science Information Service), *Federal Scientific and Technical Communication Activities–1975 Progress Report,* June, 1976, 91 pages (NSF 76-25; PB253975).

    Program descriptions of Federal STI systems and highlights of 1975 activities; over 60 Federal STI programs are described; an introductory section summarizes significant developments and trends in Federal information programs.

26. National Science Foundation, Division of Science Information (formerly the Office of Science Information Service), *The Growth of Scientific and Technical*

Information—A Challenge, Lecture and Seminar Proceedings by Dr. J. Georges Anderla, Paris University, January, 1974, 63 pages.

A lecture and discussion by Dr. Anderla is presented as well as the results of a seminar; topic is the future growth of STI; these meetings represent an outgrowth of a forecasting study (see item no. 1 in this Section).

27. National Science Foundation, *Contracts and Conclusions: A Handbook for Action Between Federal and State Government to Promote Technology Transfer*, Outcome of a workshop sponsored by the NSF and developed by the Council of Governments and the National Legislative Conference, May, 1974.

Copy not obtainable.

28. John Page, et al., *The Networking of Scientific and Technical Information, Final Report for First Phase of Study*, Organization for Economic Cooperation and Development, Scientific and Technical Information Policy Group, November 13, 1974, 162 pages.

Results of a study on how the effect of current developments in networking could determine the manner in which STI services could develop in the next decade; foreign networks discussed in depth.

29. Rowena W. Swanson, *Trends in Information Handling in the United States*, Paper presented at the Conference of the Institute of Information Scientists, University of Reading, Reading, England, May, 1970, 45 pages, paper sponsored by the United States Air Force, Office of Scientific Research (AD-710322).

General discussion of U.S. information handling trends including specialized information products, cooperation and networking, standards, and trends.

30. The Conference Board, *Information Technology: Initiatives for Today—Decisions That Cannot Wait*, Part two of a study on information technology and some critical implications for decision makers in 1971-1990, prepared for the Senior Executives Council of the Board, Report No. 577, 1972, 50 pages (Charles M. Darling III, et al.).

Presents 10 issues that call for policy-level attention today; information issues in general are discussed; not addressed specifically to STI (see item no. 31, below).

31. The Conference Board, *Information Technology—Some Critical Implications for Decision Makers*, First report in a series of management of change studies directed by the Board, Report No. 537, November, 1971, 240 pages.

Series of 9 papers is presented related to the implications of information technology; not specifically addressed to STI; this report is the forerunner of the report described in item no. 30, above.

32. Westat, Inc., and Aspen Systems Corp., *Editorial Processing Center, A Study to Determine Economic Feasibility: Introduction from the Final Report,* Prepared for the National Science Foundation, Division of Science Information (formerly the Office of Science Information Service), July, 1974, 20 pages.

    Discussion of the technical, economical and organizational feasibility of developing a cooperative venture for publishing of scientific information.

33. Paul G. Zurkowski, *A Paper of Amplification: The Information Service Environment; Relationships and Priorities,* Prepared by the Information Industry Association for the National Commission on Libraries and Information Science, November 1, 1974, 27 pages.

    Discusses information in general (not STI specifically) including private sector information resources, library/industry relationships and policy questions to be addressed.

Articles

34. "Agreement Reached on New White House Science Office," *Science and Government Report,* May 1, 1976, p. 5 (2 pages).

    STI not specifically addressed.

35. "Compromise Near on White House Science Office," *Science and Government Report,* Vol. VI, No. 6, April 1, 1976, p. 1 (3 pages).

    STI not specifically addressed.

36. Burton W. Adkinson, "Federal Government's Support of Information Activities—A Historical Sketch," *Bulletin of the American Society for Information Science,* Vol. 2, No. 8, March, 1976, p. 24 (3 pages).

    Historical presentation of the Federal Government's role in information services; not specifically STI.

37. Lee G. Burchinal, "Bringing the American Revolution On-Line: Information Science and National R&D," *Bulletin of the American Society for Information Science,* Vol. 2, No. 8, March, 1976, p. 27 (2 pages).

Discussion of U.S. STI efforts including benefits of information services, justification for information science research and increasing effectiveness of the overall STI enterprise in the U.S. today.

38. Burt Nanus, "Information Science and the Future," *Bulletin of the American Society for Information Science*, Vol. 2, No. 8, March, 1976, p. 57 (2 pages).

    Discussion of the information industry in the U.S., future trends, and the need for a national information policy.

39. Judith A. Werdel and Scott Adams, "U.S. Participation in World Information Activities," *Bulletin of the American Society for Information Science*, Vol. 2, No. 8, March, 1976, p. 44 (5 pages).

    Historical perspective of the evolution of U.S. information services, growth of international cooperation, and an index of international information and programs currently in existence.

40. Lee G. Burchinal, "Re-Examination of Federal Activities," *Bulletin of the American Society for Information Science*, Vol. 2, No. 6, January, 1976, p. 9 (2 pages).

    Discussion of the need for formulation of policies to guide Federal/private STI interaction and presentation of a four-point approach to achieving such policies.

41. Lee G. Burchinal, "Microforms and Electronic Publication: Emerging Bases for Scientific Communication," *IEEE Transactions and Professional Communication*, Vol. PC-18, No. 3, September, 1975, p. 174 (3 pages).

    Discussion of the use of microforms to support scientific journals including goals for estimating the degree to which U.S. primary distribution activities contribute to the national good and questions to be addressed.

42. Luther J. Carter, "Science Policy: House Committee Wants in on the Action," *Science*, Vol. 187, March 21, 1975, p. 1061 (1 page).

    STI not specifically addressed.

43. Roger Revelle, "The Scientist and the Politician," *Science*, Vol. 187, March 21, 1975, p. 1100 (6 pages).

    STI not specifically addressed.

44. William D. Carey and Richard A. Scribner, "Organization for Science and Technology in the Executive Branch," *Science*, Vol. 187, March 7, 1975, p. 810

(5 pages), A White Paper of the American Association for the Advancement of Science.

STI not specifically addressed.

45. Eugene Skolnikoff and Harvey Brooks, "Science Advice in the White House? Continuation of a Debate," *Science*, Vol. 187, January 10, 1975, p. 35 (7 pages).

STI not specifically addressed.

46. Detlev W. Bronk, "Science Advice in the White House: The Genesis of the President's Advisers and the National Science Foundation," *Science*, Vol. 186, October 11, 1974, p. 116 (6 pages).

STI not specifically addressed.

47. G. B. Kistiakowsky, "Presidential Science Advising," *Science*, Vol. 184, April 5, 1976, p. 38 (5 pages).

STI not specifically addressed.

48. Edward E. David, Jr., "Prospectus for Science Advising," *Science* Vol. 183, March 1, 1974, p. 801 (1 page).

STI not specifically addressed.

49. Alvin M. Weinberg, "Scientific Communications," *Science and Technology*, 1963, p. 18 (6 pages).

Discussion of information transfer as an inseparable part of R&D; the information problem as it exists today; transfer and dissemination of documents; suggestions to the technical community and Federal agencies re information transfer.

SECTION IV
OTHER LEGISLATIVE REFERENCES

General

1. American Association for the Advancement of Science, Memorandum to Chairman Olin E. Teague, Committee on Science and Astronautics, U.S. House of Representatives, on Committee Hearings in Federal Policy, Plans and Organization for Science and Technology, May, 1974, 26 pages (Jurgen Schmandt).

   STI not specifically addressed.

2. Industrial Research Institute, Federal Science and Technology Committee, Comments Upon Hearings Before the Committee on Science and Astronautics, U.S. House of Representatives, July 17, 19, 23, and 24, 1973 on Federal Policy, Plans and Organization for Science and Technology, April 2, 1974, 6 pages (Glenn Nesty).

   STI not specifically addressed.

3. Library of Congress, Congressional Research Service, *Science and Technology in Policy Formulation at the Presidential Level*, Issue Brief No. IB74096, May 24, 1976, 15 pages (Dorothy M. Bates).

   STI not specifically addressed.

4. Library of Congress, Congressional Research Service, Federal Policy, Plans and Organization for Science and Technology, An Unstructured Critique of the July 1973 Hearings of the House Committee on Science and Astronautics, April 26, 1974, 26 pages (Dorothy M. Bates and Franklin Huddle).

   STI not specifically addressed.

5. U.S. Congress, House, *Calendars of the U.S. House of Representatives and History of Legislation*, 94th Congress, 2d Session, Monday, June 14, 1976, p. 109.

   STI not specifically addressed.

House

6. U.S. Congress, House, *A Bill–National Science Policy and Organization Act of 1975, H.R. 4461*, 94th Congress, 1st Session, March 6, 1975, 40 pages.

   Title IV, page 29, calls for the establishment of a Science and Technology Information and Utilization Corporation.

7. U.S. Congress, House, Committee on Government Operations, Foreign Operations and Government Information Subcommittee, *Federal Information Systems and Plans—Implications and Issues, Part 3, Hearings*, 93d Congress, 2d Session, January 29 and 31; February 5, 1974, Committee Print, 403 pages.

   General discussion and identification of issues dealing with the Federal use of information and communications technology; not directed specifically at STI.

8. U.S. Congress, House, Committee on Government Operations, _____, *Federal Information Systems and Plans—Federal Use and Development of Advanced Information Technology, Part 2, Hearings*, 93d Congress, 1st Session, June 19 and 26; July 17 and 31, 1973, Committee Print, 599 pages.

   General discussion of the Federal use of information and communications technology; not directed specifically at STI.

9. U.S. Congress, House, Committee on Government Operations, _____, *Federal Information Systems and Plans—Federal Use and Development of Advanced Information Technology, Part 1, Hearings*, 93d Congress, 1st Session, April 10 and 17, 1973, Committee Print, 217 pages.

   General discussion of the Federal use of information and communications technology; not directed specifically at STI.

10. U.S. Congress, House, Committee on Science and Technology, Subcommittee on Domestic and International Scientific Planning and Analysis, *Intergovernmental Dissemination of Federal Research and Development Results, Oversight Hearings*, 94th Congress, 1st Session, November 4, 5 and 6, 1975, Report No. 94-48, 753 pages.

    STI discussed generally in terms of needs of state/local governments, especially re NTIS; Federal technology transfer programs also described.

11. U.S. Congress, House, Committee on Science and Technology, *Science and Technology Policy*, 94th Congress, 2d Session, April 26, 1976, Conference Report No. 94-1046 to accompany H.R. 10230, 21 pages.

    Same as P.L. 94-282; also includes joint explanatory statement of the Committee of Conference.

12. U.S. Congress, House, Committee on Science and Technology, *Science Policy, A Working Glossary*, Third Edition, 94th Congress, Committee Serial X, March, 1976, prepared by the Congressional Research Service, Library of Congress.

    Copy not obtainable.

13. U.S. Congress, House, Committee on Science and Astronautics, *Federal Policy, Plans and Organization for Science and Technology, Interim Report*, 93d Congress, 2d Session, July 10, 1974, H. Report, No. 93-1184, Serial P, 263 pages.

    STI not specifically addressed.

14. U.S. Congress, House, Committee on Science and Astronautics, *Federal Policy, Plans and Organization for Science and Technology, Part II, Hearings*, 93d Congress, 2d Session, June 20, 25, 26 and 27; July 9, 10, 11, 16 and 18, 1974, Report No. 50, 826 pages.

    STI not specifically addressed.

15. U.S. Congress, House, Committee on Science and Astronautics, *Federal Policy, Plans and Organization for Science and Technology, Hearings*, 93d Congress, 2d Session, July 17, 19, 23 and 24, 1973, 180 pages.

    Copy not obtainable.

16. U.S. Congress, House, Committee on Science and Astronautics, *Public Technology*, A report of the Hon. George P. Miller, 92d Congress, December, 1972, Committee Print Serial DD.

    Copy not obtainable.

17. U.S. Congress, House, Committee on Science and Astronautics, *National Science Policy, H. Congress Res 666, Hearings*, 91st Congress, 2d Session, July 7, 8, 21, 22, 23, 28 and 29; August 4, 5, 11, 12 and 13; September 15, 16 and 17, 1970, Committee Print No. 23, 963 pages.

    STI not specifically addressed except by Mr. Clarence H. Linder, President, National Academy of Engineers, page 513.

18. U.S. Congress, House, Committee on Science and Astronautics, *Technology Assessment: Annotated Bibliography and Inventory of Congressional Organization for Science and Technology*, 91st Congress 2d Session, July 15, 1970, Committee Print, Serial Q, 91 pages.

    STI not specifically addressed.

19. U.S. Congress, House, Committee on Science and Astronautics, *The Management of Information and Knowledge*, Proceedings from the eleventh meeting of the Panel on Science and Technology, 91st Congress, 2d Session, January 27, 28 and 29, 1970, Committee Print No. 15, 237 pages.

General discussion of the impact of the computer, cybernation, and communications on modern day and future societies to identify problems areas; STI not specifically addressed.

20. U.S. Congress, House, Committee on Science and Astronautics, *Science and Technology and The Cities*, A compilation of papers prepared for the tenth meeting of the Panel on Science and Technology, 1969, Committee Print, 126 pages.

    STI not specifically addressed.

21. U.S. Congress, House, Committee on Science and Astronautics, *Centralization of Federal Science Activities*, House Document No. 91-172, Prepared by the Congressional Research Service, Library of Congress, 1969.

    Copy not obtainable.

22. U.S. Congress, House, Committee on Science and Astronautics, *Government, Science, and International Policy*, Proceedings from the eighth meeting of the Panel on Science and Technology, 90th Congress, 1st Session, January 24, 25 and 26, 1967, Committee Print No. 1, 220 pages.

    STI not specifically addressed.

Senate

23. U.S. Congress, Senate, *Science and Technology Policy*, 94th Congress, 2d Session, April 26, 1976, Conference Report No. 94-765, to accompany H.R. 10230, 16 pages.

    Language identical to H.R. 10230 and P.L. 94-282.

24. U.S. Congress, Senate, *National Policy, Organization, and Priorities for Science, Engineering and Technology Act of 1976*, 94th Congress, 2d Session, February 3, 1976, Joint Report No. 94-622, to accompany S.32, 47 pages.

    Language of S.32; STI references similar to H.R. 10230; includes narrative discussion of legislative history, an explanation of need for the bill, a conference with the Vice President, excerpts from testimony obtained during hearings, and comments from Federal agencies.

25. U.S. Congress, Senate, *An Act—National Science and Technology Policy and Organization Act of 1975, H.R. 10230*, 94th Congress, 1st Session, November 11, 1975, 21 pages.

    Language of H.R. 10230 provided; STI references similar to P.L. 94-282.

26. U.S. Congress, Senate, Committee on Labor and Public Welfare, *National Policy and Priorities for Science and Technology Act of 1974*, 93d Congress, 2d Session, October 9, 1974, Report No. 93-1254, to accompany S.32, 26 pages.

    STI not specifically addressed.

27. U.S. Congress, Senate, Committee on Labor and Public Welfare, Special Subcommittee on the National Science Foundation, *National Policy and Priorities for Science and Technology Act, 1975, Joint Hearings*, 94th Congress, 1st Session, October 28, November 4 and 12, 1975, on S.32, this subcommittee plus the Subcommittee on Science, Technology, and Commerce of the Committee on Commerce, and the Committee on Aeronautical and Space Sciences, 498 pages.

    STI not specifically addressed.

28. U.S. Congress, Senate, Committee on Labor and Public Welfare, Special Subcommittee on the National Science Foundation, *National Policy and Priorities for Science and Technology Act, 1974, Hearing*, 93d Congress, 2d Session, October 8, 1974, Committee Print, 700 pages.

    Text of S.32 included; discussion of state governmental technology assessment systems provided; supporting data on Federal support of R&D also included; STI not specifically addressed.

SECTION V
SELECTED LAWS

1. Safe Water Drinking Act, P.L. 93-523, December 16, 1974.

   Environmental Protection Agency

   - Collect and make available information pertaining to research, investigations, and demonstrations with respect to providing a dependably safe supply of drinking water together with appropriate recommendations in connection therewith.

2. Solar Energy Research, Development, and Demonstration Act of 1974, P.L. 93-473, October 26, 1974.

   Energy Research and Development Administration

   - Development of activities, arrangements and procedures for the collection, evaluation and dissemination of information and data related to solar energy resource assessment.
   - Establish a Solar Energy Information Data Bank to collect, review, process and disseminate information and data in all of the solar energy technologies.
   - Enter into international agreements to facilitate the exchange of information and data related to solar energy resource assessment and technologies.

3. Energy Reorganization Act of 1974, P.L. 93-438, October 11, 1974.

   Energy Research and Development Administration

   - Disseminating information resulting from programs sponsored by ERDA.
   - Developing, collecting, distributing and disseminating STI concerning the manufacture or development of energy or its efficient extraction, conversion, transmission or utilization.
   - Creating and disseminating general information to the public.

4. Juvenile Justice and Delinquency Prevention Act of 1974, P.L. 93-415, September 7, 1974.

   National Institute for Juvenile Justice and Delinquency Prevention

   - Establish a centralized research effort on the problems of juvenile delinquency, including an information clearinghouse to disseminate the findings of such research and all data related to juvenile delinquency.

- Serve as an information bank by collecting data and knowledge obtained from studies and research by public and private agencies and the like concerning all aspects of juvenile delinquency.

National Institute of Corrections

- Serve as a clearinghouse and information center for the collection, preparation, and dissemination of information on corrections, including programs of crime and recividism, training of corrections personnel, and rehabilitation and treatment of criminal and juvenile offenders.

5. Solar Heating and Cooling Demonstration Act of 1974, P.L. 93-409, September 3, 1974.

Energy Research and Development Administration

- Collect and evaluate data and information on the performance and operation of solar heating and combined solar heating and cooling systems installed in residential dwellings under this Act.
- Insure that full and complete information with respect to the activities conducted under this Act is made available to Federal, state and local authorities, the building industry, and related segments of the economy.
- Establish and operate a Solar Heating and Cooling Information Data Bank for the purpose of collecting, reviewing, processing and disseminating solar heating and cooling information and data.
- Provide retrieval and dissemination services for Federal, state and local government organizations, universities, colleges and other nonprofit organizations, and private persons upon request.

6. Geothermal Energy Research, Development and Demonstration Act of 1974, P.L. 93-410, September 3, 1974.

Energy Research and Development Administration

- Establishment of a program to encourage States to establish and maintain geothermal resources clearinghouses to provide information on laws, rules and regulations and to coordinate the processing of permit applications and impact statements.

7. 1974 Amendments to the National Cancer Act of 1971 (P.L. 92-218), July, 1974.

National Cancer Institute

- The Director shall collect, analyze and disseminate information useful in the prevention, diagnosis, and treatment of cancer, including the establishment of

an international cancer research data bank to collect and disseminate the results of cancer research undertaken in any country for the use of any person involved in cancer research in any country.

- The Director shall provide for a program to disseminate and interpret, for practitioners and other health professionals, scientists and the general public scientific and other information respecting the cause, prevention, diagnosis, and treatment of cancer.

8. National Diabetes Mellitus Research and Education Act, P.L. 93-354, July 23, 1974.

National Institutes of Health

- Develop a long-range plan for a coordinated research program to include a system for the collection, analysis and dissemination of all data useful in the prevention, diagnosis, and treatment of diabetes; development of knowledge and dissemination of such knowledge to the public.
- Development of research and training centers to include information programs for physicians and allied health personnel.
- Establish a Diabetes Coordinating Committee to include provisions for the full communication and exchange of information necessary to maintain adequate coordination of Federal health programs.
- The Director of the National Institute of Arthritis, Metabolism and Digestive Diseases, working through the Associate Director for Diabetes, shall establish programs for the dissemination of knowledge related to research and training in diabetes.

9. Health Services Research, Health Statisitcs, and Medical Libraries Act of 1974, P.L. 93-353, July 23, 1974.

National Center for Health Services Research

- Undertake and support research, evaluation and demonstration projects related to health services and systems.
- Establishing new centers one of which shall focus on all forms of technology, including computers and their application to health care delivery.

National Center for Health Statistics

- Collect statistics on the nature of illness and disability of the population of the United States and other health-related conditions.

- Support research related to new or improved methods for obtaining current data.
- Assist state/local agencies and other Federal agencies in the design and implementation of a cooperative system for producing comparable and uniform health information and statistics.
- Collect data annually from the records of births, deaths, marriages and divorces in registration areas.
- Participate with other countries in cooperative endeavors in health services research and statistical activities.
- Make available, on as broad a basis as possible, the results of health services research; provide indexing and abstracting services leading to more efficient dissemination of information on health services research.
- Issue information related to public health at least weekly.

10. Energy Supply and Environmental Coordination Act of 1974, P.L. 93-319, June 22, 1974.

Energy Research and Development Administration

- Broad authorization given to the Federal Energy Administrator to collect such energy information as necessary to carry out the purposes of this Act or the Emergency Petroleum Act of 1973. Specific reports required which imply certain information collection procedures; however no specific information program is prescribed.

11. Research on Aging Act of 1974, P.L. 93-296, May 31, 1974.

National Institute on Aging

- Carry out public information and education programs designed to disseminate as widely as possible the findings of Institute-sponsored or other relevant aging research and studies, and other information about the process of aging.

12. Historical and Archeological Data—Preservation, P.L. 93-391, May 24, 1974.

Department of the Interior

- Provides for the preservation of historical and archeological data (including scientific and technical) which might otherwise be lost as a result of the construction of a dam.

13. Federal Energy Administration Act of 1974, P.L. 93-275, May 6, 1974.

Federal Energy Administration

- Collect, evaluate, assemble and analyze energy information on reserves, production, demand and related economic data.
- Collect from agencies of the Federal Government information concerning energy resources on lands owned by the Government including quantities of reserves, current or proposed leasing arrangements, environmental considerations, and economic impact analyses.
- Provide for a central clearinghouse for Federal and State agencies seeking energy information and assistance.

14. The National Institute of Child Health and Human Development P.L. 93-270, April 22, 1974.

National Institute of Child Health and Human Development

- Develop public information and professional education materials relating to sudden infant death syndrome and disseminate such information to persons providing health care, to public safety officials, and to the public.
- Contract or make grants for the collection, analysis and furnishing of information relating to the causes of death and the provision of information and counseling to families affected by sudden death.

15. The National Center on Child Abuse and Neglect, P.L. 93-274, January 31, 1974.

National Center on Child Abuse and Neglect

- Develop and maintain an information clearinghouse on all programs showing promise of success, for the prevention identification, and treatment of child abuse and neglect.

16. Drug Abuse Office and Treatment Act of 1972, P.L. 92-255, March 21, 1972.

Special Action Office for Drug Abuse Prevention

- Provide for a central clearinghouse for Federal, State and local governments, public and private agencies and individuals seeking drug abuse information and assistance.
- Establish, within HEW, (1) an information center for the collection and dissemination of all information relating to drug abuse prevention functions, including statistics, research and other pertinent data and information, (2) investigate and publish information concerning uniform methodology and technology for determining the extent and kind of drug use by individuals and effects of such use, and (3) gather and publish statistics pertaining to drug abuse.

17. Reorganization Plan No. 3 of 1970, Environmental Protection Agency, 35 F.R. 15623, 84 Stat., December 2, 1970.

Environmental Protection Agency

- Gathering of information on pollution and the use of this information in strengthening environmental protection programs and recommending policy changes.

GLOSSARY

AAAS	American Association for the Advancement of Science
COSATI	Committee on Scientific and Technical Information of the Federal Council for Science and Technology
DDC	Defense Documentation Center
DHEW	Department of Health, Education and Welfare
DHUD	Department of Housing and Urban Development
DOA	Department of Agriculture
DOD	Department of Defense
DOL	Department of Labor
DOT	Department of Transportation
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
FCST	Federal Council for Science and Technology
FEA	Federal Energy Administration
FY	Fiscal Year
GAO	General Accounting Office
GSA	General Services Administration
IBM	International Business Machines Corporation
LC	Library of Congress
MIT	Massachusetts Institute of Technology
MITRE/METREK	The MITRE Corporation, METREK Division, McLean, Virginia
NAS-NAE	National Academy of Sciences-National Academy of Engineering

NASA	National Aeronautics and Space Administration
NBS	National Bureau of Standards
NCLIS	National Commission on Library and Information Science
NIH	National Institutes of Health
NOAA	National Oceanic and Atmospheric Administration
NSF	National Science Foundation
NSF/DIS	National Science Foundation/Division of Science Information (formerly the Office of Science Information Service)
NTIS	National Technical Information Service
OBM	Office of Management and Budget
OST	Office of Science and Technology
OSTP	Office of Science and Technology Policy
PSA	President's Science Advisor
PSAC	President's Science Advisory Committee
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
SATCOM	Committee on Scientific and Technical Communication, NAS-NAE
SEC	Securities and Exchange Commission
SSIE	Smithsonian Science Information Exchange
STI	Scientific and Technical Information
STINFO	Scientific and Technical Information
USDA	United States Department of Agriculture
VA	Veterans Administration

☆U.S. GOVERNMENT PRINTING OFFICE: 1977 722-013/109 1-3